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## WARNER OBJECTIVE SIGHTING SYSTEM

FOR

United States Springfield Service Rifle Model 1903

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“OUR national security, indeed the very national existence itself of these United States may shortly depend upon the speedy training of 500,000 men who can *shoot to hit*.”

Nearly four years of experiment and development by a corps of expert riflemen and mechanics have perfected a simple mechanism which enables the common soldier to adjust his battle sight accurately to range while under fire, by a movement as instant, direct and automatic as that by which he throws in a cartridge or pulls trigger, *and to do so without once taking his eye from the individual enemy he has determined to hit. “It’s the hits that count.”*

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**To double the efficiency of battle marksmanship, reduce waste of ammunition and elevate morale of troops is to turn the scale of war.**











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This announcement concerning development of the Warner Objective Sighting System has been printed principally for the information and reference of members of the Board of Ordnance and Fortification and of officers of the School of Musketry, U. S. A. A limited number of copies have also been struck off for other officers of the Government and of the Army and Navy and for civilians who have given to this work the benefit of important advice and assistance.

To the perfection of this system, which had its crude beginnings nearly four years ago, there has been devoted the skill of a corps of experts of distinguished ability in their several professions. It would be scarcely possible for one unacquainted with the work to believe what a wide area of effort has been covered in study of the subject of field sighting from every angle, and in design, construction and trial of one mechanical device after another, in the very earnest attempt to fairly exhaust the subject and finally to produce the simplest and best form of practical every-day service sights for rifles, and particularly for military rifles.

As to military rifles, the results are herein described. The Objective Sighting of hunting rifles — a very different matter as to mechanical particulars — is also touched upon as of collateral interest at this time but must await a less disturbed condition of affairs for announcement in detail.

This work has from the very start proceeded with due regard for secrecy, and no publication of any item of information concerning the same has been permitted. A considerable number of perfected sights are about to be subjected to a series of comparative tests covering problems of fire, attack and defence, at the United States School of Musketry, Fort Sill, Oklahoma, and in Massachusetts at ranges especially prepared for this purpose.

Upon completion of all these tests this manuscript may be released for general publication. Meanwhile, the recipient hereof is respectfully requested to safeguard the same and retain it in his personal possession.

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PRESS OF GEO. H. DEAN  
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Captain James H. Keough, Sixth Massachusetts Infantry, firing U. S. Springfield rifle with Warner Objective Battle Sight. In upper figure he fires at object dimly seen in grass, distance estimated 400 yards. In lower figure, observing shot to throw up sand short of his objective, he removes finger from trigger to set sight up to 500 yards without removing eye from objective, after which he makes second shot hitting the object.

# WARNER OBJECTIVE SIGHTING SYSTEM

A successful attempt to repair fifty years'  
neglect of a vital function of firearms.

With high appreciation of encouragement received from the Secretary of War and the Board of Ordnance and Fortification, and with grateful acknowledgment to soldiers and riflemen who have contributed to this work much expert advice and assistance, including particularly General Charles K. Darling, Captain Stuart W. Wise, Captain James H. Keough, Mr. Walter S. Wait, Mr. Adolph O. Niedner, Mr. George F. Day and Mr. Edward P. Warner.

*Warner, Edward P.*



"One thing is absolutely true — that no important achievement has ever been accomplished in any avenue of human activity that has not had, as one of its basic forces, the rule of accuracy."

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## FUNDAMENTAL FACTS

The decision of war depends upon success in injuring the enemy while avoiding return injury. This is fundamental, and the main chance of success lies in the shoulder arm. No weapon of offence or defence has yet been devised which will take the place of the individual shoulder rifle *when aimed to hit!*

This has been true in modern military operations generally and is true of the present European conflict, in spite of the unprecedented development of artillery fire which has characterized some phases of this war. Certain writers whose attention has been arrested by the spectacular injuries inflicted here and there by high explosive shells, or by the deadly results from fire of machine guns at points especially favoring their use, have jumped to the conclusion that wars are hereafter to be fought by artillery, and a prominent educator has even gone so far as to suggest the abandonment of present forms of shoulder arms in favor of a rapid fire gun to be carried by each man.

In support of this argument it has been suggested that men formerly carried very heavy shoulder arms and can therefore do so again; that a man can if necessary carry a rapid fire weapon weighing possibly seventeen or eighteen pounds, and that with such a weapon, "firing 500 shots a minute" he will become irresistible as compared to the present infantry-man.

It is unfortunate that these commentators do not carry their argument a step further and explain who is going to supply this soldier with ammunition, which he is to shoot at the rate of 500 shots per minute. At twenty cartridges per pound, 500 cartridges weigh twenty-five pounds, and it does not take much pencil and paper to demonstrate that at this rate one man with such a rapid fire gun could explode a ton of ammunition within two hours.

It has been stated that the German commanders are content if they kill one enemy per ton of ammunition expended. It is not out of reason



that this may in fact be so, for that would in cartridges mean 40,000 cartridges, and by comparison, in the Russo-Japanese war, deaths are stated to have been in the proportion of one to 20,000 cartridges consumed.

Considering the enormous stores of ammunition which the Germans had accumulated for this war, and the exceptional facilities of transport by rail and auto car which enable them to pile ammunition up to the firing line, it might readily be granted that they would expend ammunition per enemy killed at twice the rate of the Russo-Japanese war.

All this, however, constitutes but a weak argument in favor of equipping infantry altogether with rapid fire guns instead of shoulder arms of substantially the present form. Not every contestant in war has ready for hostilities enormous stores of ammunition nor is he able to do a large percentage of his fighting concealed in five hundred miles of deep trenches, and closely backed by a net-work of railroads and thousands of auto cars.

The conditions which have resulted in such great use of artillery and rapid fire guns, principally by the Germans and French, are special conditions, and while, under these special conditions, the proportions of casualties due to artillery have, particularly during the last nine months in Belgium and France, been, so far as can be determined at this time, considerably greater than in other recent wars, even at some points and for a few weeks extending to 50 per cent of the total, still it is by no means certain that the same thing will be found to have been true of the tremendous wide sweeping field movements of the Teutonic and Russian armies in the eastern field of operations.

It would not be at all surprising to careful students of military matters, to learn when this war is over and the statistics are all available, that the total casualties due to artillery have not, on the whole, been appreciably greater than in other recent wars. In the American Civil war ninety-one per cent. of the casualties were inflicted by shoulder arms. In the Russo-Japanese war eighty-four per cent. of injuries were due to shoulder arms. The other sixteen per cent., included every nature of injury, whether from artillery, sabers, bayonets, kicks of horses, stones, or otherwise.

The operations of modern artillery, like those of the aeroplane and submarine, are highly spectacular, but we must not for this reason be drawn into any hasty conclusions with regard to the further usefulness of the

battle ship or the shoulder rifle. As a matter of fact, great changes in all human affairs proceed slowly. Every department of military activity must be judged at its own worth and its rise or fall will depend upon its development of actual efficiency in real service, and not upon its spectacular features.

There have always been those who would sweep aside all previous engineering accomplishments of the age, at the appearance of a new factor. The announcement of the telephone was to be the death knell of the telegraph, but the telegraph has since multiplied an hundred fold. The wireless was to send all wires to the scrap heap, but the use of wire lines in the United States since the invention of wireless has multiplied perhaps ten times. Electric light was to put the gas companies out of business, but the gas business is better today than ever before. Similar examples from engineering history could be recited almost without limit.

It is the business of engineers, including the military engineer, to weigh each element dispassionately, and to assign to each its true relative value after expert study of the facts. Under the average conditions of great military operations, including the entire world, an average of difficult terrain, poor transportation, and the necessity of speedy mobilization of hostile operations in unexpected directions, either for advance or retreat, the main chance has always lain in the infantry, and there is nothing up to date to indicate that it will not always lie there, or that the operations of the battle ship, submarine, artillery, machine gun or cavalry, will not still in the last analysis all have to be considered as preparatory to the effective operations of infantry, which must achieve whatever victory may be the ultimate purpose of a war-like operation.

It goes without saying that every department of military engineering should be persistently developed to its highest possible efficiency, but considering the importance of this arm, this is especially true of infantry and infantry equipment, and it is particularly true in regard to the infantry of nations which are animated by no aggressive policy, but which depend rather for defence in the greater part upon volunteer citizen soldiers.

The very earliest operations of the present conflict brought this fact out sharply. It was the superior *shooting* of the individual British soldier which enabled England, illy prepared, lacking artillery and ammunition, yet still to throw her small force into the balance in France and help save Paris from the on-rushing German hordes, without courting disaster.

The later stages, and the crucial stages of the drive for Paris were necessarily so swift that machine guns and artillery played the smaller part; the fate of Paris actually hung at the last upon infantry fighting and shoulder arms, and at the English end of the line the superior *battle marksmanship* of the British soldier enabled the small British force to out-fight its antagonists three to one.

Our American military problem is for much the greater part a problem of defence; a problem of utilizing a small regular army and a volunteer army, at present small, and in any event but of moderate proportions, to defend quickly any point of two very long coastal frontiers, thousands of miles apart. This will have to be done by infantry capable of speedy movements by rail and on foot, with adequate but not clumsy or disproportionate support of aeroplanes, artillery, cavalry and the like.

The infantry is, and the infantry, so far as human experience up to date indicates, will continue to be the most important arm of the service, and the various problems of infantry equipment are, therefore, the most important problems of equipment with which the service has to deal.

An old Company Commander, in a communication to the Army and Navy Journal of January 25, 1915, says:

“After all, the fundamental duties of Infantry are only three: *Hike, Dig, Hit*. *Hike*, so as to reach the place in good time and in good condition; *Dig*, enough to construct the simple shelter trenches required by modern combat; *Hit the other fellow first, hit him hard, quicker and harder and oftener than he can hit back*. The Infantry that can do these things will win on any battlefield; and of all these *the crux, the climax, the very reason for the existence of Infantry is to hit*.”

If then, in the final analysis the infantry be considered the most important branch of the service, and if the very reason for its existence is to hit, it seems very logical to conclude that the weapon with which the infantryman does his hitting is the most important single item of military equipment, and that hardly any greater service for defence can be rendered than to actually improve in a small or great degree the *hitting efficiency* of the infantryman's weapon — the shoulder rifle.

A great amount of military engineering talent of the highest order has been devoted to the improvement of the character and management of the



shoulder arm, with the resultant modern development of small calibre, steel jacketed projectiles and smokeless powder, fired from rifles of good mechanism, adapted to rough usage.

Among the best of these weapons, if not the very best of them all, is the United States Springfield, Model 1903 Military Service rifle. Granting the excellence of this weapon in most respects, there has yet remained the supreme necessity of making its fire *hit the enemy* while in the hands of a common soldier of average intelligence, but for the most part of limited actual experience in warfare. This depends upon two things, viz.: *morale*, that is to say, the soldier's *nerve*, and *mechanism of direction*, that is to say, *his battle sight*.

*Target* sighting under the cheerful conditions of peace is a well-developed art. *Battle* sighting remains substantially where it stood at the time of the American Civil War. There has been practically no advancement in this regard in fifty years.

Not only has this resulted in stupendous waste of ammunition, but also in vital injury to morale. A man who knows his gun will not hit anything save by chance, wants to run away, and most of the casualties inflicted with present battle sights *are a matter of chance*.

Earl Kitchener and Lord Roberts both declared at the beginning of the present war that marksmanship would be a most important factor in the war, and this opinion has since been supported by statements of many commanders of prominence in the various armies, and has in fact been generally recognized by military men of experience of every army.

Nevertheless, the operations of all modern armies have been characterized by stupendous wastefulness of ammunition and it has been difficult to improve the marksmanship in war of the common soldier, because it has been necessary for ninety-nine per cent. of soldiers to use a single battle sight, correct for only one range, over-shooting everything within that range, under-shooting everything outside it.

There has been available no mechanism which could save by a small fraction of sharp-shooters, be adjusted to range under fire. To permit most soldiers to adjust *target* sights under fire is equivalent to shooting all ammunition harmlessly into the country behind the enemy, for such adjustments

made in action by ninety-nine per cent. of men invariably produce the wildest over-shooting.

This accounts for the rule that, save for sharp-shooters, there must in action be used only the single battle sight. In the case of the United States service rifle this sight is correct at 547 yards, *and over-shoots everything inside that range, from several inches to several feet.*

The short-comings of this system of fire have been generally recognized by officers of practical experience, but by no one has the necessity for good marksmanship and the reasons for the lack of it among American infantry, and to a greater extent among the infantry of almost every other nation, been more clearly brought out than by Major John H. Parker of the Eighth U.S. Infantry in his admirable article in the Journal of the Military Service Institution for March, 1915, entitled "Some Observations on Infantry Technic," and from which I quote a few expressions at random:

"The facts remain: A company composed of good riflemen is sure to give a good account of itself in a fight. A company composed of poor riflemen may be coached by expert officers and non-commissioned officers (if any are available) into some semblance of real efficiency in action; but a company of good riflemen will go ahead without officers, if necessary, and render effective service. American troops have done this time and again."

"It can be maintained that recruits are rarely natural good shots; that the handiness of the American of today is not equal to that of forty years ago, or that of fifty years ago; and that we shall not have good, well-trained riflemen unless we spend the necessary time on that subject to get the desired result."

"One single shot, an aimed shot, by a sharp-shooter, pointed to hit a particular man at 700 yards, and which hit him, had probably as much effect in hastening the surrender as all of the thousands of bullets fired from the gatling guns; for that shot brought down General Linares, the Spanish commander. When we talk about depreciating the value of certain kinds of training, let us throw a brick at the fellow who depreciates marksmanship. Usually the man who talks that way is maneuvering army divisions in his mind on a map. Generally he has had little or no experience in actual warfare; certainly very little in scouting, patrolling and in the bushwhacking sort which was most of the Philippine warfare."

“Of the three fundamental duties of the infantry to *shoot*, and to shoot to *hit*, is the most important by far, the one for which infantry exists, and without which it has no reason for existence. And in proof of the correctness of this, just let any one of the modern school say which he would prefer with him on a dangerous mission with a patrol of one platoon — a platoon composed of men who can shoot straight and *hit*, or one composed of men who cannot. Remember, about ninety per cent. of infantry duty will be encounters of small detachments, patrols, advance guards, outposts, foraging parties, attacks of guerrillas, where it is all over in ten minutes except burying the dead and caring for the wounded.”

“In the last few years a good deal has been said about the small difference in effect between the fire of good and that of poor shots in action. Much has been said about ‘cones of fire,’ ‘beaten zones,’ and ‘collective effect.’ Above all, more recently, great stress has been laid upon the extreme value of ‘superiority of fire’ through ‘rapidity of delivery.’ Eight to fifteen shots per minute per man is the latest accepted doctrine, and we are urged to ‘overwhelm the enemy,’ get ‘superiority’ of fire at the earliest possible moment; generally we are told that this can be best accomplished by a tremendously rapid rate of fire. Nobody has yet told us how we are going to get ammunition at the *short* ranges where battles are *decided*, if we shoot it away in the *first* part of the fight.”

“Our experiments showed that there is what might be called a critical range, *beyond* which more hits can be expected if the ammunition is fired in a *machine gun*, and *within* which more may be expected if it is *fired by the men*. That critical range, as should have been expected, was at about the limit of individual aim — about 700 yards.”

“The scientific thing to do is to turn loose the machine guns at the longer ranges, and hold back the infantry fire *until men can select their individual targets*.”

“*Let us quit preaching waste of ammunition; it is too valuable in a fight; the supply is too limited.*”

“I have never been able to understand the pseudo logic which perfects an accurate instrument and then imposes conditions which prevent the user of that instrument from availing himself of its accuracy. That is the condition we have in using the ‘battle sight.’ The rifle is one of the most perfect



instruments ever made. With a properly adjusted sight, hitting is merely a question of holding. But with the 'battle sight' holding must be *off*, instead of *on*, the target; the rifleman has no definite point of aim, but must estimate the number of inches he must hold *off* the point to be hit, *as well* as *estimate* the *range*. Such estimates introduce an element of inaccuracy which cannot be neutralized by any amount of skill."

In emphasizing these remarks of Major Parker and others, in regard to individual marksmanship, I would not be understood to minimize the value and necessity of training of marksmen to co-operate effectively as an organization. We cannot have individual marksmen going off on their own hook and get any considerable results from military operations. This has been very well pointed out by Captain Henry E. Ames of the 28th U. S. Infantry, whose experiments have demonstrated that individual training of riflemen alone is not sufficient, but granted equal training in field exercises, it can hardly be doubted that the company of expert battle marksmen will defeat two or three times their number of trained men who cannot make hits, for it's the *hits* that count.

Ninety percent of cartridges now fired in battle might better be taken to sea in lighters and dumped overboard, for as now used after much difficult and costly carrying about, the firing of it only wears out rifles and impairs morale without even annoying the enemy. This is for the greater part the fault of established systems of battle sighting.

**To the great question of battle marksmanship, therefore, which, considering all the facts, is, it seems to me, the most important technical military problem now demanding solution, a corps of experts of the highest skill, whom I have brought together, have devoted themselves for over three years.**

We believe that we have solved the problem; that we have developed a new principle of firing rifles in warfare, and that we have perfected a successful mechanism for the application of this principle to service conditions of all sorts.

**The task we laid down for ourselves was this: We must enable the soldier to sight his rifle accurately while under fire by an operation as simple, positive, automatic and as nearly subconscious as that by which he now throws in a cartridge or pulls trigger, and he must be able to do this instantly, from range to range, while his eye and his mind are kept constantly focused upon an individual enemy.**

Judging by previous standards this seemed to be impossible. Nevertheless, after making and trying dozens of devices, employing every sort of mechanical principle, we have accomplished it.

The device we have produced we call the Warner Objective Sight, for the reason that it enables the soldier to keep his *eye* and his *mind* upon his objective and gets him out of the *subjective* state of mind. In a word he thinks about his enemy instead of about *himself*, and he can *hit* his *enemy*, his *objective*.

**This result has been declared by military officers of experience to be the most important development in the practical use of shoulder arms since the invention of smokeless powder. They have declared after shooting our rifles objectively sighted that such sighting will for a given expenditure of ammunition in battle increase the hits tenfold. We believe it would be not too much to say that it will enormously reduce waste of ammunition, increase greatly the number of hits which can be made in a given time, prolong the life of rifles in service, elevate morale of troops and turn the scale of war.**

Imagine a rush on trenches. From where I sit near the New England coast between Boston and New York, the waters of a small bay are visible a thousand yards away. We are on a little rise with open fields about — an admirable spot for quick trenching against coastal landing parties. The water is shallow but will accommodate lighters for troops and the spot is favorable for seizing an important railroad junction.

Yesterday a hostile squadron heavily shelled and crippled nearby fortifications, and during the night several regiments of our infantry have been rushed by rail to defend points favorable for landing all along this coast. Here we have only four companies, but all well dug into trenches by daylight and ready for business.

At earliest dawn a flotilla of enemy lighters is seen drawing up to shore and a regiment of infantry are embarked — three times our number! Our position is quite unknown to them, but lies directly in the path of their advance. Our movement has been so hasty that we have not been able to bring along any ammunition to waste, having only about 150 rounds per man. It will not do at all for us to shoot it all away at fifteen shots per minute for the first ten minutes, for if we do we shall most assuredly be beaten.

The ground over which the enemy must advance is slightly undulating,

marshy, with scattering small pines, patches of high grass and two or three fields of corn 4 or 5 feet high. Also it is crossed by several drainage trenches.

The limit at which it is possible to distinguish an individual man moving across such ground is about 700 yards. Consider first the nature of the fight which is about to take place if we be equipped with single battle sights, correct only at 547 yards. If warned by our officers to shoot at individual targets and avoid waste of ammunition, we shall at 700 yards make some few hits, for we are going to overshoot enough under these circumstances so that our 547 yard sight will be tolerably good at from 650 to 700 yards. The hits, however, will probably not exceed one in 100 shots, and if our company has seen no previous service, and has only been recruited within a year, they will probably at this range not exceed one in 500 shots.

At 600 yards we shall do a little better. As the enemy advances now by short rushes, plunging down into cover and returning our fire, it will be very difficult to make any hits at all. Groups of fifty or an hundred men rise suddenly and make a quick run of fifty yards and disappear. They run so fast it is impossible to shoot at them, and while we can see them disappear, we are sure to overshoot them now more and more, for they are at 400 yards or 350 yards, and our "battle sights" are beginning to help the enemy as the range decreases.

It begins to look bad, for their numbers are but little diminished. We are sure to get somewhat rattled and as they get in to 250 yards we are overshooting them three or four feet in spite of the constant warnings of our officers to "hold under."

The last 100 yards is free of cover, but men rushing forward cover 100 yards in a very few seconds. We shall come to bayonets outnumbered two to one, with but one possible result. When outnumbered you have got to *stop* the enemy by *hits* for you *cannot* beat him at cuts.

With Objective Sighting, on the other hand, we shall at 600 yards begin shooting with deadly accuracy and with perfect confidence in our weapons. As the enemy drops into cover at 500 yards he will find himself suffering, even at this great range, more casualties than expected, for we are accurately sighted and are shooting directly *at* the spot into which he has dropped.



At 400, our sights again accurate, will enable us to begin getting rather important results. At 300, the sights again accurate, firing at objectives seen to move, or seen to drop into this bit of cover or that, we are sure to hit hard, and the enemy is at a great disadvantage by reason of the fact that he is attacking up rising ground, can barely see our hats, is winded with running and falling, and is in all probability using the ordinary battle sight, inaccurate save at one range.

At 200 yards the casualties which he suffers will be terrific, and we should not have twenty men hurt. All this gives us great confidence and injures his morale. Every one of us is watching for a given enemy and shooting *at* him. One of two things is sure to happen; either we shall come to bayonets on even chances, or more likely, the demoralization of such deadly fire will stop him, and as he breaks back for the shore his punishment will continue until he has got out beyond 500 yards. Before he can be strongly reinforced a battery of artillery has come to our assistance and the day is saved.

In recent conversation with an experienced rifleman who had been shooting a United States service Springfield rifle at one of our Massachusetts ranges, first with regular service battle, and afterward with Objective battle sight, I said: "From my own experiences with both hunting and military rifles Objectively sighted, and considering the present great waste of ammunition in battle, the time it takes to waste it and the ground gained by the enemy while it is being wasted, I feel no doubt whatever that the installation of Objective sights upon the service rifle of the United States Army will double the battle efficiency of our infantry — the strongest arm of the service — and turn many a defeat into victory;" to which he replied: "What you say is perfectly true, but only too conservative. The fighting value of our infantry would be far more than doubled, for I think that the change in sights would multiply the hits in battle more nearly by ten than by two and it's only the hits that count."

Having produced a battle sight adapted to these ends we have attempted to combine with it substantial improvements of the target sight also, and have succeeded in producing a very lively micrometer adjustment for the use of sharp-shooters, thus providing for this important branch of the service more successfully than has been done heretofore.

*The net result is this: We have enabled the common soldier, not in ten*

*seconds or twenty seconds, with warm fingers and cool nerves, but instantly with fingers numb and nerves hot, to change his battle sight with deadly accuracy and always with his eye on the enemy, and*

*We have provided the sharp-shooter with a target peep sight which he can, even with numb fingers adjust almost instantly and with great accuracy to any range up to and including 2000 yards.*

We have fortunately been able to arrange for the production of these sights in the excellent shops of the Greenfield Tap and Die Corporation at Greenfield, Mass. This concern, one of the largest of its class in the world, enjoys an enviable reputation as a skilled manufacturer of instruments of precision, and has long been relied upon by many of the best known American Engineering Works as well as by several of the Government Arsenals, for the construction of dies and gauges as standards for fine work.

We have had little difficulty in convincing the officers of this progressive concern that the practical development of the Objective theory of battle sighting and fire control constitutes an advance in the art of war of the first importance, and they have willingly placed their exceptional manufacturing facilities at the disposal of this production as a very practical contribution to the efficiency of national defence.

They are now equipping a special shop with automatic machinery which will enable them shortly to produce our sights in large quantities, of Mark I model, for instant sliding into the windgauge base of United States Springfield rifle, model 1903, in substitution for the present service sight.

**With their help we hope to convert the "Zone of Danger" into a Zone of Hits — to resight the rifles of a nation and thus at a stroke to double its effectiveness in battle.**

If we are really to prepare for defence we should start by recognizing that the Fates protect the efficient — not the negligent. War is a business proposition. It is no answer to this statement of fact to call it "unfeeling" or "horrible." We shall make no permanent progress toward decreasing or abolishing war until we are willing to start by facing the fundamental facts.

We live for posterity and "business" is simply organized effort to provide food, clothing and shelter for the benefit of posterity. When compe-



tition in this business becomes too keen, Nation A begins killing the men of Nation B, in order to safeguard supplies of food, clothing and shelter for the posterity of Nation A.

When a war, dreadful as it is, has thus been started, the anguish and burden of it are only intensified and prolonged by inefficiency, and what shall be said of the business efficiency of a war management which expends a ton of material to do work which, at maximum efficiency, requires less than one ounce.

A ton of ammunition with the rifles which its shooting consumes, are worth over \$2,000. Even if with proper battle sighting we made only one effective hit in one hundred shots, and I believe we should do much better, we should, as compared to this maximum of inefficiency, save \$2,000, and also economize other things much more valuable, viz.: the life and strength and morale of our own soldier. Even if the cost in dollars did not count, the value of ammunition and guns when really needed on the battle line simply cannot be measured, for in the "crisis of the offensive," depending so often in its final stage upon ammunition supplies, national existence itself may be at stake.

If we would defend our supplies of food, clothing and shelter for our posterity without supporting the burden of a great standing army, we must develop superior business efficiency for a smaller army.

The sight of a rifle seems a little thing, but, like the small periscope of a deadly submarine, it is absolutely vital to effective work. Its imperfections are multiplied tenfold in wastefulness of ammunition and impairment of morale. Every improvement in its practical effectiveness on the firing line which can be accomplished, is worth an hundred times its cost in resultant improvement of morale, increase of casualties of the enemy, saving of ammunition, prolonging of the life of the rifle and saving of the valuable life of our soldier himself, who has at so great an expenditure of time and national wealth been clothed, trained and transported to the firing line with the whole final object of making the greatest ultimate possible number of hits while avoiding injury to himself. "It's the hits that count."

ROBERT L. WARNER.

50 Congress Street,  
Boston, Sept., 1915.

## WARNER OBJECTIVE SIGHTING SYSTEM

“How does it feel to be under fire?” inquired a visitor to the British lines in Belgium. “Most of the time we are *so far under the fire* that it does not feel at all” was the reply of the soldier.

In the field of action overshooting is universal. Every experienced hunter of big game knows this, and everyone who has seen troops in action knows it still better. Even the veteran hunter, or the veteran soldier, long experienced at the targets, and with nerves hardened by a lifetime of practice, still finds it almost impossible in the heat of action, with the best sighted rifle, to hold his fire closely down to his objective.

This is due principally to the fact that he is unable, in attempting to keep his eye upon his objective, to avoid getting too much of his front sight, or too little of his rear sight, and he can only get himself better in hand to do this as he gains confidence in the accuracy of his firearm.

The moment he begins to feel that he has in hand an arm inaccurately sighted, which he cannot by any means available adjust instantly to an accurate sighting, he is irresistibly and unconsciously impelled to make up for this inaccuracy by throwing more shots.

This condition of impending panic as his game begins to get away, or his enemy begins to fire back at him, accelerates rapidly until the hunter or soldier, as the case may be, finds himself firing wildly with no result whatever, except to destroy the morale of himself and those about him.

The tendency to over-shoot accelerates rapidly with men less hardened, achieving finally, in the case of a raw recruit, a nearly unconquerable impulse to blaze away with his gun at hip, injuring nothing save by the merest chance, and only wasting a scandalous weight of ammunition.

This is mainly a matter of psychology, and our chief effort must be directed to helping the man achieve a better control over his mental processes and his own nerves by simplifying and perfecting his control of fire; to establishing firmly in his mind a subconscious habit of reliance upon his ability to adjust his battle sight to range accurately, instantly and automatically.

During twenty years rifle mechanisms and ammunitions have enormously improved, but rifle sighting for battle service has stood still. The old leaden slug with low velocity, falling rapidly to the ground after the first few yards of flight, has given place to the steel, or copper-covered sharp pointed projectile of small calibre, propelled by smokeless powder at such great speed that considerable improvement of fire is achieved solely by reason of the consequent flatter trajectory.

Concurrently, mechanisms of loading and discharge have also been greatly improved, and one unfamiliar with the facts might be excused for assuming offhand that some substantial advancement must also have been made in the theory and mechanism of directing these high-speed projectiles effectually against the enemy under service conditions, but the contrary is the fact.

In respect of battle sighting we are hardly better off than at the time of the American Revolution — the farmers of Concord and Lexington used flint-lock guns having no rear sight whatever, with a larger percentage of hits than are scored with modern weapons in battle.

A recent English volume by a well known author, which describes in interesting detail all manner of firearms, including military shoulder rifles, to the extent of eight hundred pages of text, devotes to the matter of military sights only a single item about five lines long.

This illustrates very well the prevalent practice which generally is to carry the development of the military firearm very carefully up to a point where it is almost fit to *hit* something, and then balk at the task of furnishing it with a simple means of accurate adjustment to its supreme purpose of making *hits*.

It would scarcely be exaggeration to declare that no improvement whatever in battle sighting of shoulder arms has been made in fifty years. Many target sights of fine mechanism, at the summit of which stands the telescope sight with its delicate adjustments, have enabled individual sharp shooters, well sheltered from weather, with warm hands, at known ranges, against plain targets, to do good shooting.

As a factor in war, however, this is almost negligible, not only because these fine mechanisms will not stand the great abuse to which they are unavoidably subjected in war, but more especially because in war not one



soldier in a thousand is able to use them at all, and even the sharp shooter himself can hardly use them in heat of action with fingers numbed by cold or rain.

Many of the great armies in battle depend for the major part upon a single sight, subject to no adjustments for different ranges. The excellent United States Springfield service rifle, for example, one of the best of modern military weapons, carries a battle sight correct at 547 yards, and greatly overshooting everything inside that range, and our work with the Ross Canadian service rifle indicates overshooting with the battle sight of from two to seven feet at ranges from 100 to 500 yards.

In other words, in order with standard battle sights to *hit* an enemy at moderate ranges with either the United States or Canadian rifle, you have got to shoot "*under*" him from two to seven feet, unless he has obligingly consented to help you out by standing up full height.

This is not the fault of drill masters or army officers. They very wisely forbid the indiscriminate raising of target sights by common soldiers, well knowing that to permit this would generally result in a pushing up of the target sight to ranges many hundreds of yards beyond the objective. It has been generally necessary for them to fall back upon a rule forbidding the raising of these sights, save by sharp shooters.

The remaining result has been called "zone firing," and in the attempt to find an excuse for it there has been developed the theory that firing with these single battle sights creates a "zone of danger" several hundred yards in extent which is unhealthy for a man six feet high. This "zone of danger" argument depends for its support upon the hypothesis that enemies stand around at full height within the "cone of fire."

Returning to fundamentals, however, it is apparent at a glance that in only a small percentage of cases is any enemy seen standing full height within the "cone of fire" determined by such battle sights. He is in trenches, or in bushes or woods, behind dead horses, crawling through the grass, stooping for a quick dash and plunging down again behind any convenient cover.

He is seen to move behind his cover, or in the bushes or grass; he presents an objective not six feet high, but possibly eighteen inches high, and very

often merely an indistinct small movement of something at some point in the terrain. If the eye be fastened upon this movement, as upon the falling golf ball, and an attempt be made to guess the range, there may be hope of hitting him.

Let us suppose that he is three hundred yards distant. With our battle sight we have got to hold several feet "*under*" him. In *looking* for this place several feet under him we *lose* him. If we look from him to adjust our sight we lose him. If we could keep our eye firmly fixed upon him, or upon the spot where the movement took place, right where we know he is although we cannot now see him any more than we could see a golf ball which had dropped right there, and if we could by a movement, simple, subconscious and automatic, adjust our sight instantly and accurately to that range as we judge it, we should make a deadly shot. Or, if it be not deadly, we should judge ourself to have guessed the range too far or too near, and if we could then by a simple movement — simple as that by which we throw in a new cartridge — adjust the sight for the nearer or farther range, we should make a deadly shot.

And these very things we *can do* with the Objective Sight. With this sight our aim may instantly be made *correct* instead of *approximate* for any determined range lying within a practical field of vision.

The highly unsatisfactory character of the results achieved by established systems of rifle fire as demonstrated during wars of the very recent years in Africa, Asia, Mexico and Europe, has been emphasized in numerous editorial comments of the general press and special articles of military authorities in the scientific and technical journals, calling attention to the great importance of accurate marksmanship as perhaps the first lesson to be learned from these wars.

The value of marksmanship has always been well recognized by American commanders, and in fact, English speaking governments generally have for centuries encouraged the development of marksmanship by rifle practice. See for example, the curious 33d Statute of Henry VIII, which seems to fall particularly pat at the moment, considering the present activities of Americans generally in matters pertaining to defence:

"Provided alway, and be it enacted, etc., that it shall be lawful, from henceforth, to all gentlemen, yeomen, and serving-men of every lord, spiritual

and temporal, and of all knights, esquires, and gentlemen, and to all the inhabitants of cities, boroughs, and market towns, of this Realm of England, to shoot with any hand-gun, demihake, or hagbut, at any butt or bank of earth, only in places convenient for the same; so that every such hand-gun, etc. be of the several lengths aforesaid, and not under. And that it shall be lawful, to every of the said lord and lords, knights, esquires, and gentlemen, and the inhabitants of every city, borough and market town, to have and keep in every of their houses such hand-gun or hand-guns, of the length of one whole yard, etc., and not under, to the intent to use and shoot in the same, at a butt or bank of earth only, as is above said, whereby they and every of them, by the exercise thereof, in form above said, *may the better aid and assist to the defence of this Realm, when need shall require, etc.*”

It is hard to understand why the improvements in mechanisms of war should have been so persistently accompanied by increased waste of ammunition, and in fact this wastefulness seems to have been very marked from the earliest introduction of fire arms. Fremantle in his “Book of the Rifle,” quotes an amusing proof of this fact from a book, “Instructions for the Warres,” translated from the French by Paul Ive in 1589, as follows:

“The Harquebusse hath bin inuented within these fewe yeares, and is verie good, so that it be vsed by those that haue skill, but at this present euery man will be a Harquebusier: I knowe not whether it be to take the more wages, or to be the lighter laden, or to fight the further off, wherein there must be an order taken, to appoint fewer Harquebusiers, and those that are good, than many that are worth nothing: For this negligence is cause that in a skirmish wherein tenne thousand Harquebussados are shot, there dieth not so much as one man, for the Harquebusiers content themselves with making of a noyse, and so shoote at all aduentures.”

Wastefulness of ammunition for one cause or another has been characteristic in a greater or less degree of all modern wars. It is stated, for example, that in the battle of Salamanca 3,500,000 rounds of rifle ammunition were expended, resulting in only 8,000 casualties; that is to say, one hit for 437 shots. Military science must indeed rest under a grave indictment of inefficiency when we consider that even so late as the Russo-Japanese war the best it could do after expending untold treasure in equipping and transporting great bodies of troops to the firing line, was to get one dead enemy for 20,000 cartridges.



That our own army chiefs realize the need of improving individual as well as collective battle marksmanship, has been well shown by the encouragement given our efforts by the Board of Ordinance and Fortification, and is indicated by the following quotations from memoranda dated May 11, 1915, addressed to the President of the National Rifle Association by Brigadier-General A. L. Mills, Chief, Division of Militia Affairs, and approved by Mr. Henry Breckenridge, Assistant Secretary of War.

“The habit to be acquired through target practice is that of employing *only aimed fire*. We do not expect accuracy, but we may hope for a *reasonable percentage of hits*.”

“Individual marksmanship is only a step toward the collective marksmanship *without which battle fire cannot be effective*.”

Circular No. 3, this office series of 1914, says:

“The efficiency of the squad, including its leadership, is the basis of efficiency, and this efficiency in turn *depends on the thoroughness of the training of individual members of this unit*.”

Granting that our battle sight should, in the first instance, be adapted to meet the greater need of the greater number; that is to say, of citizen soldiery of limited training and possibly little or no training at the butts, nevertheless the skill of marksmanship resultant upon long training at the butts is always very important when it can be had.

Consider for example the fight between 500 men of the Sixth Massachusetts Volunteers against approximately 800 Spaniards during the Spanish War near Guanica, Porto Rico. Hardly more than an affair of the outposts, it yet serves to illustrate the difference between aimed and unaimed shooting.

The firing began about midnight and continued intermittingly until after sunrise when a sharp action took place. The advantage lay with the Spaniards for the reason that they were concealed in tropical growth, while the Americans advanced through and across open valleys to dislodge them. The Sixth Massachusetts is a regiment of marksmen, the teams of this regiment having repeatedly beaten all comers from the regimental teams of the United States Army and Volunteer Militia.

The Spaniards on the other hand had limited training at the butts, but depended upon the "Zone of danger" principle. Note the result:

Casualties to Spanish: Killed and wounded 52.

Casualties to Americans: Wounded 4.

An officer of the Sixth Massachusetts, in explaining this result, says: "They did not aim at us individually — we did aim at them individually." And he says also, that "the casualties to the Spanish would have been two or three times as great if the Americans had been able to aim directly at individual Spaniards as seen occasionally moving through the cover, instead of being obliged to aim under them with the United States battle sight; that is to say, if the Sixth Massachusetts had been equipped with Objective Sights, the same casualties would have been inflicted in shorter time with much less expenditure of ammunition, or in the same time with same ammunition the number of casualties would have been trebled."

"Volley firing" of rifles means *overfiring* 999 times out of 1000. It is identical with the attempt of an amateur to hit a deer or even a quail. A Tyro upon seeing two or three deer in a perfectly open place, will begin blazing away at them as rapidly as he can, but hitting no deer. The veteran will coolly aim carefully, low down on the fore shoulder of one deer, and bring him down with one shot.

It is the same thing with quail. Many times one sees a Northern man in Southern game fields banging both barrels of a shot-gun at a flock of rising quail, but never a quail comes down. After he has done this many times, hitting no quail, he begins to realize that the Southern hunter beside him is shooting each barrel of his gun at a single quail upon which he has fixed his eye the moment the flock rises. When the Northern sportsman goes to try this, he will to his surprise soon begin to drop a couple of birds from each rising flock, the birds upon which he has concentrated instantly his eye and all his mental power. He has substituted "Objective firing" for "volley firing."

"Volley firing" will be necessary at times. It is not always a matter of lying in trenches and under good cover. Masses of men must occasionally charge against other masses of men, firing volleys, but this volley firing should, so far as possible, be directed against individual enemies over sights adjusted to the lowest possible range. Volley firing against troops, as at



present conducted, is in the main a pure waste of ammunition, since present battle sights are arranged for over-firing even at moderate distances. When troops get in hand the objective sight, and for volley firing are under orders to use it at the lowest range and are taught to shoot at individual enemies so far as possible, even under such circumstances, the increase of mortality among the enemy will be relatively as great as it is when for volley firing against quail, there is substituted *objective firing*.

Students of psychic phenomena declare that the human brain is divided into two departments; the objective mind, which deals consciously with external objects; the subjective mind, which deals subconsciously with the internal affairs of the body. The subjective mind is unconsciously concerned with the welfare of the body — with self-preservation. It causes the soldier to dodge the whistling bullet which has already passed his head, it inspires him to flight. It is not concerned with team play, it looks out only for the individual; it impairs morale.

If we would make of our man a good soldier, we must keep him out of the subjective state of mind by focusing his mentality upon an external objective. The Objective Sighting System is a long step in this direction. The soldier may now keep his eye and mind focused upon his enemy and escape the voice of the subjective mind. Instead of hearing that voice say: "I am in danger — the enemy has his eye on me — my weapon is inaccurate — I must flee," he says consciously: "There is the enemy, I have my eye on him — I can hit him, for my weapon is accurate."

He has got out of the subjective state of mind into the objective state of mind — his value as a soldier has been doubled.

The extreme importance of accurate battle sighting is well emphasized by the numerous photographs now coming from the front in Europe and portraying eloquently the conditions under which millions of men along a battle line of five hundred miles are day by day exerting their wits to avoid exposure, while taking advantage of every exposure upon the part of a single individual enemy. No "zone firing" about this. It is a matter of watching for the movement of an arm, or head beside a clod of earth, or behind thin bushes fringing trenches.

The range is now well known from days or weeks of firing, or from the officer's range finder. The enemies' cap dimly seen through that tuft of grass

is 200 yards away. It is equivalent to an eight inch bullseye, but it does not stand out boldly and black against a white piece of paper. It will not suffice to shoot four feet over it, and it is impossible to hold four feet under and hit it.

It will be difficult, very difficult indeed at best, to hit it even with a sight accurately adjusted at 200 yards, and quite impossible otherwise. Our soldier, realizing this fact, slips back into the trench and begins the difficult and slow adjustment of his target sight to this range. As he returns to the edge of his trench one of two things happens. Either his movement attracts the fire of the enemy and he himself goes back with a broken shoulder, or, if he escapes this, he finds that his tuft of grass is one of many—he cannot now pick out again the one which dimly shields his objective.

I have before me at the moment a picture of a soldier, prone, amongst thin bushes ten or twelve inches high, rifle extended in front of him, cap off, face blackened, watching the head and shoulders of an enemy sentry beyond the rise across a little valley. I imagine he is studying the range; that he has just concluded it is about 300 yards; that he wishes to high heaven there were some means whereby he could slip his right hand forward to his sight, constantly watching that sentry, to be immovable when he turns, to adjust that sight with certainty to 300 yards, return his finger to the trigger, pausing motionless when the sentry turns, then with deadly certainty bringing him down.

But he has not the means to do so. He must withdraw his rifle from in front of him, rise upon his elbow to get at the sight, look down upon it and begin to adjust it. He knows that he must do this and he does not dare try it, for if while at it the sentry turns, it will result in discovery. He will take a chance, therefore, in hope of a score, and ten chances to one he will miss his man.

Such work takes place many times within five or six hundred yards. Even a full sized man standing erect and motionless, makes a poor mark at five hundred yards. The French have therefore wisely included the following in their catechism of a soldier in time of war:

“When I am alone, I will not fire at more than 400 meters (435 yards) on a single man, or at more than 600 meters on a group of men.”

The Objective Battle Sight, model Mark I, which we are now making

for the United States Service Rifle, is accurate at ranges from 200 to 600 yards, and the 700 yard range is also added objectively by picking up the leaf sight, for the open sight on top of the leaf slide set at its lowest point, stands at 700 yards, and can be thrown up instantly without taking the eye from the enemy.

In the event that the Board of Ordnance and Fortification should adopt our sights, I should personally strongly recommend reducing the lower range to 100 yards and the 700 yard range to 600 for the reasons above mentioned, and for the further reason that this would tend to put an additional restriction upon the everlasting and universal over-shooting in general. And I should recommend this in spite of the fact that the excellent United States service rifle sighted accurately at 200 yards will over-shoot less than three inches at 100 yards, for in trench warfare *extreme* accuracy at 100 yards has come to be recognized as vital to the most effective work.

General French, commenting upon the development of accuracy of fire between the trenches in Belgium, some of which are only seventy-five yards apart, says: "For the *slightest* undue exposure the heaviest toll is exacted."

Even at 100 yards an individual enemy moving in cover is not easy to hit, and a difference of three or four inches may make the difference between a broken arm and an enemy uninjured. I am disposed to think the battle sight should be absolutely accurate at 100 yards, and absolutely accurate at every 100 yards up to and including 500 yards. The common soldier should not be permitted to attempt adjustments beyond 500 yards or 600 yards. Sharp-shooters only should be permitted to attempt the raising of sights beyond this range.

Let us see then what would be the essential characteristics of an ideal military rifle sighting mechanism for all purposes. In the first place it should, as to every adjustment, be a single handed, right handed sight, that is to say: it should be feasible to make with the right hand every adjustment of either the battle sight or target sight while the left hand is entirely devoted to holding the rifle or to steadying it firmly if prone upon the ground. Every adjustment should be one which a soldier can make between the thumb and forefinger of his right hand to any desired position, quickly and accurately, while holding his weapon comfortably in his left hand and without turning it around sidewise into any unnatural or uncomfortable position. Then, having due regard to the main chance, we must first of all present a good battle sight for the



common soldier. This should be strong, of neat appearance, offering no sharp projections to catch upon the clothes, instantly adjustable to extreme accuracy, and should afford a reading scale at natural angle to the eye for use when desired with the word "yards" plainly stamped in.

A new soldier in the field will not otherwise be always sure of what his sight means, whether yards, meters, or what. All battle sights should be marked in full figures, viz.: 200, 300 yards, instead of 2, 3, etc. We must not leave any room for the common soldier to doubt at any time when he stops to look at his battle sight what it actually means — it must mean at a glance clearly "300 yards," etc.

The battle sight should operate by the most natural movement of a knurled trunion head between the thumb and forefinger, extended straight out from the body along the barrel while lying prone, close to the ground.

It should be simple in construction, reduced to the lowest possible number of pieces, designed for demounting without tools, very durable and subject to the least possible injury by rust, sand, water, snow and the like.

It should be so easy to adjust that with the coldest fingers any man can instantly set it to the range desired, but so well held in position that it cannot slip or move from an adjusted range, save at the will of the operator.

These important points are, however, all secondary to the factor of principal importance, viz.: The battle sight must be adjustable by the soldier under all sorts of conditions with absolute certainty of range while he keeps his eye constantly upon his objective and lies close to the ground.

Having first achieved these things we may attempt to provide for the important business of the sharp-shooter at long range. Let us suppose that an officer on the firing line has, with his binoculars, observed officers of the enemy to come and go from a small house distant upon the terrain, determined by range-finder to be 1200 yards away. Here is a job for sharpshooters. A dozen officers and orderlies have just been seen to enter the house; they may not remain thirty seconds. If five sharpshooters can instantly adjust to the range and focus their fire upon the windows of that small house we shall achieve a deadly result.

For such service and for general use at the butts, and in matches in time of peace, a target sight should possess these characteristics: It should be strong, of simplest possible construction, accurate to the last degree and should occupy a position of permanent and stable equilibrium. It should afford a choice of

**peep or open sight to be determined by conditions of weather or light, and individual eye sight.**

These specifications cannot possibly be fulfilled by a ramp sight. We doubt if they can be met at all save by means of a vertical sighting scale, and it seems possibly that some part of the success of the American military teams in international shoots may have been due to the fact that the United States Service Rifle carries a target sight of vertical scale, whereas most of the foreign service rifles use a ramp sight.

**Our target sight should be accurately compensated for drift. It should provide a simple and practical windgauge adjustment. Setting of the sight to any range from say 200 yards to 1500 or 2000 yards should be as nearly instant as possible. In order that this may be accomplished with one hand it is almost essential that there be provided some sort of micrometer thumb screw for final adjustment, for the accurate sighting of an ordinary slide with one hand when wind is blowing or fingers cold is almost impossible. At the instant of tightening a slight tremor of the body or fingers is almost sure to slip it up or down.**

**Therefore, our specifications must include an instant one hand micrometer mechanism. This device and windgauge adjustment, like the battlesight, must be designed to operate readily and instantly between thumb and forefinger of the right hand, and under all sorts of adverse conditions.**

It is impossible to adjust most of the windgauge screws now used on military rifles when rusted, or filled with dirt, or with fingers thick as thumbs when numbed with cold, but the United States standard service windgauge is an exception to this rule, and admirable in all respects, save only that the adjusting screw head is so small and so insufficiently knurled that it slips through the fingers and can scarcely be controlled when the hands are cold or the weapon fouled with dirt. We suggest the use of a windgauge screw head more like the knurled trunion head of our battle sight.

**All the above requirements have been successfully met in the combined Warner Objective Battle Sight and Warner Sharp Shooters Instant Micrometer Sight, both mounted upon Standard United States Windgauge Base with Improved Controlling Thumb Screw, and ready for instant attachment to the United States Springfield Service Rifle in substitution for present sight.**

It is today generally admitted that we should organize at the earliest possible moment a defensive army of 500,000 men. Such an army will necessarily require an adequate corps of aeroplane scouts and plentiful support of artillery.

Granted that these aids will be supplied as a matter of course, the fact remains that we cannot possibly place in the field within the near future such an efficient army of defence unless we have at once:

More schools for officers,  
More target ranges for recruits,  
More efficient battle sights.

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“High courage, sound health, power of endurance, discipline, organization and leading under the existing conditions of war all become more or less subservient to marksmanship at the supreme moment of actual conflict with the enemy.”

FIELD-MARSHAL LORD ROBERTS.



## OUR MEXICAN NEIGHBOR

Suppose we consider a problem at this moment close to home. Upon our southern side reside 15,000,000 of our neighbors; men, women and children, bleeding, starving, outraged and without hope. Assume that we have at length determined, like the good Samaritan to help our neighbor to restore order; to drive away the thieves and robbers who have beaten him; to bind up his wounds and start him going.

This will cost us something, but compared to the humane service we should render, the cost both in lives and treasure will be small for a Christian nation of one hundred million people. Our effort to assist our Mexican friends will be contested somewhat hotly by a comparatively small lawless percentage of inhabitants, largely composed of bandits and renegades accustomed to live by plunder.

It will be necessary to employ for a long time many small detachments of cavalry and mounted infantry in guerilla warfare, scouting expeditions and police work. Much the greater part of this work will have to be done in country not only devoid of railroads, but country in which no method of transport whatever is possible save upon the backs of animals; a country of desert and cactus, fierce heat and thirst, impassable mountains and deep canyons.

I speak with some feeling upon the subject, having ridden several bad mounts many a thirsty mile across northern Mexico. Assume a characteristic engagement such as will often have to be fought out by a troop of American mounted infantry against three or four times their number of Mexican Guerillas.

Our troop has been despatched to hunt down marauders say in the difficult country four or five days ride west of Chihuahua. We have got a machine gun along on a mule and a few — a very few — pack animals, but for the greater part are dependent upon the ammunition and food which each of us can carry behind his saddle.

It is the fourth day out and we are working down through a long arroyo, following up a clew picked up from a wretched, starving peon early this morning back by the muddy little "river" where we camped last night. Suddenly from above us along both sides there starts a lively rattle of shots.

We have got a couple of horses down and three or four men wounded. In a jiffy we are all off taking cover among the rocks and cactus and behind the dead horses.

Each of us has got some food and about 100 rounds of ammunition, and also, something more precious than food, and hardly less precious than ammunition, viz: a canteen three-quarters full of muddy water, for under this scorching heat an American can last but a short time without water.

Our enemy, having superior knowledge of the trails, has scouted around and got together enough bands of roving plunderers to outnumber us four to one. They have a few Mausers, but for the greater part are armed with .30 calibre American rifles. He has also a little water, but there is this marked difference: our water will keep us from going under entirely for the remainder of the day, but those brown lizards who are after our lives can stand it until tomorrow night, and still shoot after we have gone mad from thirst.

Now it all depends upon the shooting. The shooting of the Mexicans is bad. They have a superior knowledge of distances, but inferior weapons, and the sighting of their gun is an abomination. With them the shooting of any range over eighty or ninety yards is going to be absolute guess-work and mostly misses, but if we do not by superior shooting get them whipped before dark, few of us will see home again.

They are not in very close now, ranging away from 200 to 500 yards. Now if we have got the standard service battle sight, with which we must not only guess his distance, as here or there by a movement we discover an enemy, but with which we must also guess how much to hold under him, we have got a difficult job ahead of us to knock out four to one before dark.

There, right down the arroyo, I saw a sombrero move behind a bit of sage brush. I guess he is about 200 yards away. That means that I have got to hold two feet under him, but it is practically level along down the floor of the arroyo and the question is, as I lie flat, looking along the flat surface at an enemy 200 yards away, where is the spot two feet "under" him? It must be about half way from me to him; that is to say, about 100 yards.

If I try to locate that spot I am practically certain to lose track of the particular bit of sage brush, among dozens, behind which I saw him move.



But suppose that fortunately our squad has got the Objective sight. From the instant I got my eye on his movement I have held firmly to his particular sage brush — only a little grey indistinct patch it is, two feet high.

I have set the Objective sight for 200 yards. I *know* that if I have guessed the distance right and shoot carefully I am *sure* to get him. You beside me, watching the shot, exclaim “you’re short, I marked the sand fly a bit this side.” Evidently in this dry atmosphere and against the heat waves I have underjudged the distance, but I have not taken my eye for an instant from that tiny grey patch of sage brush which covers an enemy.

It is the work of a second to throw in another cartridge and advance the Objective sight to 300 yards. Again, carefully shooting, firing directly *at* the target we score, for at the shot a straw sombrero rolls into view and an arm goes up as the enemy is thrown upon his back, while from his side a companion springs up and dashes for better cover, ten yards distant behind the flat spreading lobes of a Choilla cactus.

Now we know *his* range, and the Choilla cactus is not sufficient to keep the two of us in the course of three shots, *accurately aimed*, with both Objective sights set at 300, from stirring him out of his cover with a broken arm and out of business.

Away down the arroyo, up the right hand side, two horsemen ride into the mesquite, so far away that they feel perfectly safe, considering their experience of the last three years against Mexican fire. They are at about 500 yards I think. They have stopped in the mesquite, horse high, and we can barely see the two sombreros there by watching them intently. If we had not seen them ride there and stop we could not possibly detect them, and if we take our eye from them we shall not locate them again.

It looks to you nearly 600 yards. Already you have picked up the Objective sight at 600 and I have set at 500. One of us must have been right, for at our shots a horse goes down and from the helpless attempt of the rider to care for himself as he plunges out of the mesquite, he has evidently got a bad hurt.

Meanwhile, this same thing is going on throughout our troop, our deadly fire being answered by waste of ammunition. The enemy, steadily loses hope of a chance to crawl up to his effective range of ninety yards, if not

under the heat of day, at any rate during the dark. As the sun climbs higher, most of them are knocked out, or driven out of cover and before noon we are safe.

I have drawn this little pen picture before a man who shot his way out of northern Mexico, getting across after three days and nights of running fight, with a hole in his arm, and leaving the bones of two comrades to be picked by the buzzards, and he swears it is not overdrawn in the least particular; that an average troop of American volunteers, furnished with Objective sights on our Springfield rifles would whip four times their weight of Mexicans right along, because they could make *hits* which they could not make by "*holding under.*"

## SHOTS AT RANDOM

The *Boston Herald* says editorially July 28, 1915:

"This great conflict is unmistakably an artillery war. It is the weight of guns that decides the battles, and difficult modern trenches can be taken by infantry assault only when their barbed wire entanglements have been destroyed by shell fire."

The above expression of opinion must have been induced largely by the predominance of news despatches from the short English line, entrenched as it is, and moving hardly at all from month to month. This opinion seems to totally ignore the enormous operations of millions of troops in other fields of action where there has been no time to construct entanglements, or to entrench, or to bring up any, save the lightest artillery, and where the decision of battle depends for much the greater part upon infantry and its *hits*.

*Arms and the Man*, with better technical insight into the whole problem, hits the nail more squarely as follows:

"The role of field artillery is to assist the infantry. Artillery alone cannot win battles. To rout and disperse the enemy, infantry must advance and close with him. On the other hand, infantry may not be able to advance unless the enemy's fire is kept down. So the two arms have to work together in complete mutual understanding and close co-operation in order to accomplish decisive results."

The great war has brought to the front very many radical changes in military engineering, but the end is not yet. Consider for example the proposed aerial torpedo. Imagine 500 pounds of high explosive in its brass container, with outspread wings, driven by a small buzzing propeller in its tail, responsive to the will of wireless guidance from controlling airship, circling about over hostile fleet, selecting the flag ship, slowly settling down like a great blue bottle fly upon a dying beast, alighting upon the deck, exploding itself and blowing the flag ship asunder. Very spectacular, of course, but on the whole probably not at all impossible.

Again, there is to be offered a torpedo under wireless control, containing in its nose a charge of thermit, which, at the will of the distant operator,

after the torpedo has selected its victim and pushed its nose against him, may, by developing a temperature of 3,000 degrees, readily burn a hole in the side of the battleship and crawl into the hole and blow out the bottom of the ship.

Assuming that these and other startling inventions, however intricate and complicated, and however easily upset by counter-irritants in the form of violent protecting radio disturbances which may after a long process of development and experiment, be finally perfected for defense, and that they may, upon occasion, be of some importance, it would nevertheless be most foolish for us to stop building battleships until at least *one* cruiser has suffered *actual destruction* from some such form of absent treatment.

And the same thing is true in regard to rapid fire guns and the like. General French, after nearly a year of bloody fighting against every manner of new hostile weapon, declares that "the infantry is still the queen of battles."

Manifestly, then, the thing for *us* to do is to meet these new developments through a development of the efficiency of our infantry by equipping it so that it may easily save ammunition and shoot to hit. The military authorities of the United States, aroused to the enormous waste of ammunition by overshooting under present practice, are considering the reduction of the service battle sight to a closer range, and we hear possibly to as low as 350 yards, but it must be noted that even if this sight be filed down to as low as 200 yards, which would be essential for anything approaching accurate trench and ambush work, it will then be very badly off in the other direction, undershooting by nearly five feet a man 500 yards distant, and undershooting by eight feet a horse or man only 600 yards distant.

This would be better than the present system of overshooting everything but it would be bad enough at best, compared with being able to shoot directly *at* the enemy at *any* range from 100 to 600 yards inclusive, without once removing the eye from the hostile terrain.

A French observer has declared this to be a war of marksmanship. He might better have called it a war of marksmanship *needed*, in which the *actual* marksmanship has averaged very badly indeed. What else shall be said of a war in which one ton of cartridges and ten rifles are consumed



to kill one enemy, who might have been killed with less than one ounce of ammunition properly directed.

For the ton of ammunition with which the Germans are said to be willing to use to kill one enemy, amounts in cartridges, at twenty cartridges per pound, to 40,000 cartridges. On the average the shooting of about 4,000 cartridges will destroy the rifle, thus using up ten rifles to shoot this ton of cartridges to kill one enemy.

If these ten rifles, with their 40,000 shots now used to kill one enemy, were properly sighted and used only effectively enough to make a deadly hit once in ten shots, they would kill 4,000 enemies with the same ammunition.

Every experienced big game hunter knows perfectly well that this would be perfectly possible of accomplishment in the hands of well trained marksmen. We cannot hope to have a volunteer army made up of well trained marksmen, but we can reasonably hope to have an army made up of men who can do very effective shooting indeed if properly equipped.

Is it any wonder that "this will be a very long war" if it is to proceed on any such a grossly inefficient basis of results as above described?

If the Germans had devoted less time to goose-step training and more time to developing efficiency of rifle fire to a point somewhat higher than that required in expending one ton of ammunition to "get" one enemy, they might not now be pulling down electric wires and melting up copper boilers in the attempt to maintain the tremendous supply of ammunition required by this wasteful inefficiency of their infantry in battle.

If the Russians had equipped their Moissant-Nagant rifles with sights constructed upon the Objective principle instead of furnishing them with crude and inaccurate ramp sights, they might have *stopped* the Germans by making *hits* instead of *wasting* precious ammunition and giving ground along that far flung Eastern battle line.

The German practice presents curious contrasts of wastefulness and efficiency. The greater part of their infantry are, by reason of their bad marksmanship, reduced to the doleful role of "cannon fodder." On the other hand they have a very few expert marksmen who have, with pains-

taking care, developed a high degree of skill in the use of rifles equipped with telescopes, with which they have picked off great numbers of French and British officers at long ranges.

Here again, however, we must not jump hastily to the conclusion which one casual American observer has arrived at in his suggestion that "all military rifles should hereafter be equipped with telescopes." The telescope, regardless of its high cost, is not a thing to be put upon an ordinary rifle. It involves very great delicacy of adjustment. Its mal-adjustments are difficult to perceive, except by careful trial at ranges, and impossible to determine satisfactorily in the field. Only a few of the riflemen who now have them are capable of keeping them in good condition, and of using them well.

The military rifle gets a great deal of throwing about and rough usage, but the rifle carrying a telescope has got to be nursed like a baby, and should be entrusted only to the hands of an expert marksman of the highest class who understands the extreme necessity of watching over and caring for it constantly under all circumstances, protecting it from injury of every nature, in order that it may at the crucial moment serve him well in the attempt to pick off an officer or a gunner at long range. Even this he can only do in good light and when atmospheric conditions do not fog his lenses, etc. It may possibly in a good army be justifiable to furnish the telescope as well as the range finder to one soldier out of an hundred but rarely to more.

In the face of modern developments in artillery and other arms of the service, the infantry if it would continue not only to hold the place to which it is entitled, but to enlarge it, *must improve its skirmish shooting*.

America, which has produced the submarine, the aeroplane and many other modern essentials of infantry support, surely ought not to be content to finally allow the infantry itself to go into battle handicapped by such an inefficient device as the battle sight now carried by the service rifle.

In the event of invasion, our very national existence may actually depend at the last upon the battle shooting of 500,000 new soldiers, and we cannot hope to train quickly recruits for such an army, unless we simplify their task of hitting the enemy. With the United States service sight this is now much too difficult.

The recruit becomes quickly discouraged. He cannot *hold under* and make any hits. He cannot teach himself to believe that to hit a thing he ought not to *shoot at it*. One has only to observe an officer training a recruit at target practice with the *standard* service battle sight to be convinced of this. It seems impossible for him in spite of the warnings of the officer behind him, to *make himself shoot at the grass* in the hope of *hitting the target*. How much more difficult this must be for him in battle. It is no wonder that he makes but one hit in a thousand shots, the wonder is that he ever makes a hit at all. But with the Objective sight he *can* shoot *at* his objective, and may confine his attention principally to judging distances, for having learned to judge distances his adjustments of sight will become automatic. He can now make hits right along at all ranges within the crisis of the offensive with no officer at his back to coach him.

His ability to keep his eye on the enemy and to make hits will speedily give him confidence, both in his weapon and himself. The knowledge of his superiority over his enemy in this respect will give him courage and faith in victory. He will be worth ten men oppressed by the uncomfortable feeling that they cannot hit anything; "that the blooming guns all shoot about four feet high and it's all guess-work."

The regulars, however few, must always, on account of their superior training and knowledge of military technic, form the backbone of defence, but their number is now so limited that they will necessarily be called upon in great measure to serve as drill masters for the much larger numbers of new recruits, who must be hastily trained.

Indeed, it may very well happen that a good many of us, whose marching feet are not what they once were, and who have long since forgotten our manual of arms, will have to brush up and help train new men.

I think if it should fall to my lot to undertake the work of a drill master, I would start off by teaching every man of my company to begin his day by reciting to himself a shorter catechism about like this:

"I will obey orders;

"I will take good care of my stomach, intestines and feet;

"I will lie close, dig carefully, keep my eye on an objective and try to hit it, for it's the *hits* that count!"



Imagine a foreign army of invasion once landed and dependent then, as always, upon infantry for the actual task of occupation, and attempting to contest the field with American infantry persistently trained for six months in the judging of distance in the open, and to the use of the Objective battle sight for making *hits*. Can there be any doubt as to what the result would be, granted approximately equal competence of command. Surely the *hit, hit, hit* of half a million rifles thus sighted, in the hands of such men, would be irresistible.

Existing systems of training recruits do not devote sufficient attention to the matter of shooting under such conditions as the new soldier will encounter in combat. The recruit may at targets acquire the fundamental knowledge necessary to load, sight and fire a gun, but when he gets into the field, either against game or an enemy, he faces a radically new problem.

He is sure to be somewhat excited. He feels that haste is necessary. His objective is indistinct, it moves, it hides, its range is unknown. How can he *hit* it? He *cannot hit* it but once in a thousand shots, for all this involves elements which have had no part in his training.

If we would make on short notice a good soldier for defense, we must not only give our recruit a gun which he can quickly and easily sight accurately to range, but we should give him a little practice in judging ranges and firing at moving or obscure objectives. The skirmish run is, so to speak, a move in the right direction. Massachusetts Volunteer Militia have also occasionally done some field shooting at small balloons tied out across the terrain. This has proven to be good general practice, sharpening the faculties of observation and teaching the man to judge distance. There has, however, been no where nearly enough of such practice and no regular system of tests of this nature has been established.

We have recently proposed for a series of tests in Massachusetts, the preparation of an Ambush Problem range, which would, we believe, more closely than either of these exercises, simulate service conditions under which a great part of fighting has to be done.

The basic principles of effective fighting from ambush may be condensed into a sentence, viz.: "Lie close — save ammunition — save time — make hits." That is to say, make the greatest possible number of *hits* in the shortest possible time without getting hit.



The Ambush Problem which we have proposed would, briefly described, consist of a series of targets in form similar to the standard prone figure silhouette, of neutral color and of sizes varying from about ten or fifteen inches high to four feet high, set upon sleds or low trucks and drawn across the range at every one hundred yards, beginning at 100 or 200 yards and terminating at 700 yards.

Targets to be fastened upon fibre board backs, held erect upon these trucks by a cord and spring with powder fuse, which, by the force of a bullet blow against the target will be blown, sending up a sharp puff of smoke as the target falls. Targets emerging according to a definite schedule at one range or another from screens at one side, and passing at a stated rate across behind ten small screens of pine trees or similar covering, stopping finally behind a given screen for a stated number of seconds, then moving to another and stopping, and finally, if unhit, moving off the range to safety.

Teams of two men to shoot at these targets with a given allotment of cartridges, each, for example, with an allowance of thirty cartridges, assisting each other by range guessing, etc. Schedule of target movements to be staggered so that, for example, the first target will appear at 500 yard range, next at 200, next at 600, next at 300, etc. Schedule of stopping behind screens should be similarly staggered so that contestants will be obliged to watch the whole terrain keenly and keep their eyes upon the moving enemy or upon his hiding place.

Contestants to be penalized for exposure of body or weapon above a height of say eighteen inches. This may be accomplished by arranging wire screens in a frame, separated by only one-eighth of an inch and beneath which contestants will lie so that the slightest touch of the lower screen will cause a contact with the upper, closing bell circuit.

Score to consist of number of seconds employed in firing, times number of cartridges used in firing, plus stated penalties for escape of each enemy, plus penalties for exposure: lowest score to win.

We have prepared specifications and drawings for such a range, copies of which we shall be glad to furnish upon request to any of the State or National military authorities who may wish to consider the establishment of such ranges.

Officers both of the regular Army and Massachusetts Volunteer Militia, by whom this problem has been discussed in detail, have expressed hearty approval of the same as an exercise which would greatly stimulate interest among recruits in effective shooting under service conditions, and give them much needed training in guessing distances and learning to hit indistinct objectives.

We are hopeful that a range for shooting substantially according to this plan may shortly be provided in Massachusetts, and we feel that such a range might very well be provided in every State for the use of such of its militia as have learned the rudiments of loading and firing rifles.

The shooting of this problem would certainly simulate conditions of fighting in ambush better than any established problem, even including the smoke fuses which follow the hits, for there would be present to that extent the suggestion of return fire from an enemy.

Target shooting against black bullseyes on white paper at known ranges is really but a poor preparation for fighting and field firing generally. In Alberta they told me of an English sharpshooter who came out there to hunt Antelope, wearing a beautiful display of medals all over his manly chest. He confidently expected to ride out onto the plains and knock down the first Antelope he saw, but alas, for two weeks shooting he got no Antelope, although skilfully brought up by his guide for repeated shots at from 150 to 300 yards. He departed, convinced that he did not, after all, know very much about unknown ranges, bad lights, waving grass, heat waves, and other factors involved in hitting moving game of color principally resembling its surroundings.

Dr. Louis Bell, one of our best known American engineers, in an admirable article concerning the technical side of preparedness, recently published, says upon this subject:

*"The average American starts off as a very bad shot, for the simple reason that he has had no opportunity for experience, and even with the best intentions it takes a considerable period of instruction to enable a man to handle a military rifle effectively, which is the simplest technical requirement of war. The writer has seen shooting, not by raw recruits, but by militia fairly well trained in other respects, so wild as would discredit a small boy with a stone. . . . All this takes time and patient instruction to*

an extent which only can be appreciated by those who have actually tried it out, and *suitable ranges are very few*. . . . The hour has come when there is no room for further debate, and if the country is not willing to sink into hopeless incapacity it must begin *now* to look to the defences which can be built only with toil and time."

In closing these random comments upon this subject, so vital as it is to national safety, I can do no better than to quote a line from the Edinburgh Review, which, in discussion of lessons of the Napoleonic Wars, said long ago:

"An army is *used* in war — it can only be *trained* in peace."

## EXPERT OPINIONS

MR. ADOLPH O. NIEDNER

Mr. Adolph O. Niedner is one of our best known American authorities on rifle design and construction. He is a German by birth, and was a scout with General Crook in the campaign against Jeromino in the lava beds of Arizona about 1880, during which he was shot through the body and across the head with 45-70 bullets.

Always a big game hunter and always a rifleman, he has for twenty-five years been constantly at work developing and building rifles and rifle sights and conducting experiments in ballistics.

MR. R. L. WARNER,  
50 Congress St.,  
Boston, Mass.

Malden, Mass., February 8, 1915.

*Dear Mr. Warner:*

I am familiar with the sights employed upon most of the rifles of the world, including the military arms of all the civilized nations and there is not the slightest doubt in my mind that *no sight on any arm in the world is in the same class with the Warner Objective Sight*, for skirmish work or between forces entrenched at varying ranges, or in fact for any condition of service in actual combat.

It would be simply invaluable to troops in warfare, and would in my opinion, between even numbers of men, unquestionably turn the tide in favor of forces thus equipped. This sight would make sharp-shooters out of rookies in three months.

Very truly yours,

(Signed) A. O. NIEDNER.

GENERAL CHARLES K. DARLING

General Darling is well qualified to express an opinion upon this subject, having been a constant student of military affairs. As a regimental commander he did much to keep his command highly efficient in marksmanship. He had active service with the Sixth Massachusetts Regiment in Porto Rico in the Spanish War, and is now a Retired Brigadier General of the Massachusetts Volunteer Militia.

MR. ROBERT L. WARNER,  
50 Congress Street,  
Boston, Mass.

February 1, 1915.

*My dear Mr. Warner:*

I believe you have made in your Objective system of sighting small arms a contribution to that hitherto rather neglected art, which is bound to meet with the recognition it deserves.

To change from the puttering, almost painful, and under service conditions impracticable, manipulation of the sighting devices now in use, to an adjustment so easily effected



that the sight is no longer a troublesome appendage to the rifle, is certainly a great advance. But when to that is added the substitution of an objective for a subjective state of mind in the user, his eye being constantly on the object aimed at, instead of on a vernier scale, or on the ground somewhere in the vicinity of the object (unless indeed that object has accommodately fixed itself at the presently adjusted range), your accomplishment is so far beyond anything heretofore attained in the sighting of arms that your device has only to be known to meet with general, if not universal adoption. *You have made it possible for one always to aim at what he wishes to hit, and not at the general terrain in the hope of hitting what he is not aiming at.*

The simplicity of the mechanism by which these ends are attained is in my opinion some measure of the greatness of your invention. A member of that profession, one of whose striking achievements has always been to me its ability to throw a bridge,—arched, cantilever or pontoon — with an eye to where it should land, I am sure you must have brought to this new problem your training as an engineer in thus centering upon the all-important point in a bullet's flight.

Whether or not I have correctly surmised the process by which you brought about this desired result, I certainly do congratulate you on its completely successful accomplishment. *Of its great value from a military standpoint there cannot be the slightest doubt.* It will inevitably reduce the present monstrous waste of ammunition in war, and enormously increase the effectiveness of fire, whether at an enemy partially concealed or in the open, and thus make for morale, fire control and consequent efficiency.

Very sincerely,

(Signed) CHARLES K. DARLING.

#### CAPTAIN STUART W. WISE

Captain Wise is one of the best military rifle shots in America. He is Captain in the Ordinance Department of the Massachusetts Volunteer Militia, assigned to the Coast Artillery Corps. He was high man in the International Competition at Buenos Ayres in 1912. At the great Tournament at Wakefield, Mass., in 1913, attended by some five hundred military rifle shots, Captain Wise made the remarkable score of 103 consecutive bullseyes at 800 yards, in view of which his opinion in regard to the Instant Micrometer is of particular interest.

MR. R. L. WARNER,  
Boston, Mass.

Boston, February 17, 1915.

*Dear Sir:*

After using your Objective Sight at Wakefield last week, both in slow fire and in a skirmish run, I feel that the following special merits of this sight, over any other which has been produced up to the present time, should be especially mentioned.

In skirmish firing, which is the nearest approach we have to actual service conditions, there is the necessity of keeping in mind a dozen essential features, all of which must be brought into play within a limited time. I was greatly impressed with the fact that this

sight eliminates two of the most difficult of these factors, viz.: adjustment of the sight to range, and attempting to remember changes of range and measure with the eye a certain number of inches under the distant silhouette upon the bank.

The setting of this Objective Sight from range to range was instant, and after a week's usage I am certain it would become subconscious and automatic. Its use enabled me to give over the attempt to *measure down the bank*, and for this uncertain and difficult practice there is substituted *direct firing at the target* at every range. We may now eliminate from skirmish firing practically all thought of sight, *and all thought of holding under, and concentrating our whole mentality firmly on the mark.*

Skirmish teams equipped with these sights would unquestionably have a great advantage over teams using any other military sight heretofore produced, in fact I do not see how it would be possible for other military teams to compete with them at all in skirmish firing. This, of course, amounts to the same thing as saying that *infantry provided with these sights in service would have a marked advantage over the enemy.*

Of course another very important advantage is that the elevation may be either raised or lowered at will without removing the eye from the objective, which, in shooting at targets at unknown distances, which may appear at unexpected times and places and for only brief intervals, is of great importance.

At a test made about two years ago by the State of Massachusetts at West Barnstable, platoons were brought unexpectedly into sight of large white balloons on the end of wires at unknown distances. The invariable mistake was to overshoot, although the distance was only about 450 yards, and I believe had the rifles been equipped with your sight the amount of ammunition necessary to explode these balloons would have been very much reduced, and the supply of ammunition is one of the most serious problems of modern warfare.

In regard to the target sight, using the peep *I believe that your new micrometer adjustment is one of the greatest improvements which has ever been brought out, and I shall look forward with great interest to using one of these in open matches this year wherever the sight used is optional.* This will do away, in my opinion, with carrying micrometers or verniers, as the adjustment is fine enough to answer every possible requirement, and it is simple enough so that anyone can readily use it, whereas the vernier is always open to a mistake through lost motion in the thread, or a mistake in the reading, where I have often seen an error of ten points made.

Very truly yours,

(Signed) STUART W. WISE.

#### CAPTAIN JAMES H. KEOUGH

Captain Keough is a veteran drill master, and is widely known as a successful competitor in many military rifle matches. He was a member of the team of twelve United States riflemen selected to represent the United States in the International Match at Bisley, England, in 1903. This team, on which Captain Keough was high man, won the match at Bisley and brought home the Palma trophy. He was also top man on the United States team which won the Palma trophy at Ottawa in 1912, and he saw active service in the Spanish-American War.

MR. R. L. WARNER,  
Boston, Mass.

Wakefield, Mass., February 8, 1915.

Dear Sir:

Having watched the development of your Objective sighting system from its crude beginning three years ago to its present state of perfection, I can truthfully state that you have in the Objective Sight that which has long been sought but which has not heretofore been produced, i. e., A sight that is objective in every sense of the word because it is possible to aim at the object desired to hit at all distances and because it is not necessary to take your eye from the object, *once it is located*, to make a change of sight should it be deemed necessary on account of misjudging distance, which, in my opinion is the greatest advantage the sight has over others and should prove to be of inestimable value in actual warfare as practiced today.

It seems to me that in the past, too much stress has been paid to the danger space of a rifle, with fixed sight, under the assumption that a man would be standing when shot at and which actual service proves to be otherwise. Such theory does not always work out as intended as may be shown by our own Government Battle Sight on the U. S. Magazine Rifle (point blank range 530 yards) and which I may add has not been improved upon by any other nation. Verification of my claim may be attested to by many prominent rifle shots of this country, many of them of admitted skirmishing ability, who have "also ran" in our National and Divisional Competitions because they forgot to, or were unable to, hold from 20 to 30 inches under the skirmish figure they desired to hit and which task was made doubly difficult by some deformity of the ground shot over or by the failure of the marker to put the figure above the embankment the same distance each time. No wonder it takes 1000 rounds of ammunition to wound or kill every man in the average battle when the men have such a crude form of sight and when experienced skirmishers, who have been firing for many years cannot take the average rifle (without being doctored) and place 20 shots of a skirmish run in the figure at known distances and none farther away than 600 yards. If such is the condition in time of peace, what may we expect of the raw recruit in time of battle and shivering from cold and exposure? To aim at an object other than the one desired to hit is a thing that can hardly be accomplished even by the hardened veteran and a thing which it is even impossible to consider in the training of recruits as *they simply cannot be taught to shoot 2 or 3 feet under an object in order to hit it*. All of these obstacles you have overcome in your Objective sighting system which will make a real sharp shooter out of every man of ordinary intelligence in a month or less and this might never be accomplished under the old system of *holding under*.

Yours truly,

(Signed) JAMES H. KEOUGH.

#### SERGEANT BILL RYER

When Bill Ryer was moose hunting with me near the Canadian line in Maine last November, he was constantly debating whether or not he should go back to Nova Scotia and volunteer, and after seeing me shoot and himself shooting my various rifles with objective sights, begged me almost with tears in his eyes to find some way of fixing him up with one in case he went to the front, saying:



"I just know I could get a lot of the enemy with that sight who will get away from me if I have got to try and shoot three feet under them to get them. In open country 100 good men armed with this objective sight in a two days' fight in average scattered cover, could lick 300 equally good men armed with ordinary battle sights."

After I came home, having killed a good bull on Thanksgiving day, thanks to Bill's skillful tracking, he volunteered and is now a Sergeant in the 26th Canadian Battalion in camp at Folkstone, forty-two miles from the firing line, and as he says "soon to leave for the Dardanelles." In recent letters he says:

"How I wish we had your objective sights. For God's sake do your darndest to get them for us before we leave for the firing line. Our blooming guns shoot about four feet high, and its all guess-work."

The Canadian volunteers are certainly up against a hard proposition to make any hits with the very good Ross rifle using standard battle sights. Even so good a shot as Captain Keough, with the Ross we had out at the Wakefield range, after repeated attempts to do any consistent shooting whatever over the battle sight, gave it up as practically impossible at average ranges within "the crisis of the offensive."

Just imagine the Canadian troops entrenched, firing at the advancing enemy at 500, then 400, then 300 yards, as they come on, shooting four or five feet over their heads, making practically no hits; the enemy gaining courage as a result of such an ineffective defence, while themselves making a fair number of hits owing to the fact that their own ramp sight has its low range — its battle range — at 200 yards.

It seems hardly doubtful that this extremely ineffective battle sighting of the Canadian rifles was responsible for a great part of the fearful casualties suffered by the Canadian troops who first reached the firing line, amounting in one case, we are told to 75 per cent. of a regiment.

To those of us here who had an opportunity either to shoot the Ross rifle at Wakefield, or to see it shot, first with standard battle sight, then with Objective sight, it is not at all doubtful that if the rifles of these Canadian Regiments had been equipped with Objective sights, the casualties to the enemy would have been enormously increased, with corresponding reduction of the casualties among the Canadians. It is scarcely doubtful that just this difference in sighting would have increased their *hits* ten fold.

#### COMMENTS OF A MATHEMATICAL RIFLEMAN ON THE "ZONE OF DANGER" SYSTEM

MR. R. L. WARNER,  
Boston, Mass.

Cambridge, Mass., February 15, 1915.

*Dear Sir:*

There is a theory of fire control, known as the zone system, which asserts that as much harm will be done by inexperienced men firing at random as by good rifle-shots using all possible care in sighting, range-finding, etc. This theory rests on the assumption that the good shots will not be able to adjust their sights properly, and so will group their shots in the wrong place. The absurdity of this is so obvious that refutation seems hardly necessary, but it can be readily demonstrated mathematically.



If two large bodies of troops, equal in number and 600 yards apart, are firing at each other on the zone system, the *men lying down in the open without cover*, the chances of any man being hit in the course of an average day's fighting (300 shots per man) would be 13 out of 100. The theory, on which some fire control systems rest, that men will stand up in the open to be shot at, is utterly preposterous. In making these computations I have assumed a very generous measure of accuracy, and, having regard to the number of flesh-wounds which do not incapacitate a man for further action, the chances of a man being put out of action in the course of three hundred shots *if he lay prone in average cover* probably would not be above one out of 100. That is, to put it another way, it would take 30,000 shots to put a man out of action. This checks fairly well with the figures from the Russo-Japanese war, where it took 20,000 shots to kill a man, the difference being accounted for by the fact that some soldiers will *not* follow the zone system implicitly, but will *sight carefully*.

There is a singular tendency at present manifest to foster military drill in the schools and colleges, while utterly ignoring rifle shooting, the real work of the soldier. Surely there can be no doubt that the most important thing for these young men to learn is the use of their guns under conditions approximating as closely as possible those encountered in actual field service. Even where rifle practice is required in educational and volunteer military organizations, it is of little value, since the sighting of the gun, the most difficult part of rifle shooting to master, is on an entirely different principle from that used in warfare, and most militiamen below the grade of sharpshooters never have attempted a skirmish run or fired a shot over a battle sight. *And this practical training for the mass of the young men always will be impossible until an objective sight, useful alike at the targets and in the field, is adopted for all practice with the military type of rifle, both standard and miniature.*

Yours sincerely,

(Signed) EDWARD P. WARNER.

The writer of the above letter is a member of the Senior Class at Harvard University, and a careful student of the principles of ballistics and rifle fire. He was a member of the Harvard Rifle Team which won against Yale in 1914, and high man on his team.

## CLIPPINGS

"Braver men than these Germans do not exist, but it is the bravery of men who have been taught to lean upon each other and not the cold, self-contained, resourceful bravery of the man who has learned to fight for his own hand. Two corps of our men held five of your best, day after day, from Mons to Compeigne. Lord Roberts has said that if *ten* points represent the complete soldier, *eight* should stand for his *efficiency* as a *shot*. The German maxim has rather been that eight should stand for his efficiency as a drilled marionette. It has been reckoned that about 200 books a year appear in Germany upon military affairs, against about 20 in Britain. And yet, after all this expert debate, the essential point of all seems to have been missed — that *in the end everything depends* upon the *man behind the gun* and his *hitting his opponent* and upon his taking *cover* so as to *avoid* being hit *himself*."—SIR A. CONAN DOYLE TO GENERAL VON BERNHARDI.

When a great volunteer army has to be raised quickly for defense, the thing which they most need to learn and which under existing systems of sighting is the most difficult to teach them, is to *shoot to hit*. The instructions given by Earl Kitchener at London September 2nd, 1914, to the officers who were engaged in the work of getting his volunteer army into shape, read as follows: "Never mind whether they know anything about drill. It doesn't matter if they don't know their right foot from their left. *Teach them how to shoot and do it quickly.*"

The importance of artillery support for infantry has been emphasized in press despatches during recent months largely because of the fact that those certain armies from which we get our news are nearly all closely entrenched. Before they got entrenched, however, and were able to bring up artillery, the fate of Paris was decided in the battle of the Marne and infantry decided it.

Said a British soldier wounded at that battle: "When you saw a rush start you thought that nothing on earth could stop it. That these tremendous charges were stopped and the attackers driven back in disorder is due, in the first place, I am certain, to the *magnificent marksmanship of the British soldier.*"

How much more effective will be the marksmanship of the British soldier when his weapons are so equipped as to enable him to make instant and accurate adjustment to range under every imaginable condition of service.

### "ARMS AND THE MAN"

FROM ARTICLE BY LIEUT. TOWNSEND WHELEN, APRIL 10, 1913

"The accuracy which we can now attain with the service rifle is limited by the sights. We cannot progress further in this direction without an improvement in sighting devices."

The foregoing statement is especially interesting not alone from the nature of it, but also on account of the recognized talent of the writer and his great experience.

### "TEACH THE MAN NOT THE MASS"

"The truth is that *the higher the skill of the individual men in the line the better the results* which one may expect from *their fire*. That seems a self-evident fact, but it has taken a war demonstration to prove it to some doubters.

"Do not run away with the idea that we say individual instruction is everything and that there must be no training in fire control and fire direction, but effective fire from rifles is not delivered in volleys, except in isolated cases. The moral effect from volleys midst the roar of machine guns, and from artillery, when bursting shells are adding their clamor to a bedlam of sounds, is nothing.

"What you want is an *infantry line* in which *each man is firing at a definite object and firing to hit*. *It is the shots which hit that count*. *Volume is nothing, direction is everything*.

"No country has officers more able than those found in the American Army and Navy, but the general indifference of the public has made it impossible to do more than a few of those things which should be done if we are to avert the storm which must inevitably come on."

While we shall, when this storm comes on, sorely need submarines, aeroplanes and very large amounts of medium calibre light artillery, we shall need *more than all else* 500,000 men who can *shoot to hit*.

### "OUTING"

#### ERRORS IN "ZONE FIRING"

"Even with the modern rifle it is still necessary to *hit* a reasonable number of times in order to disturb seasoned troops greatly. Mere weight and speed of fire soon lose their terrifying effect. Furthermore, it is *doubtful* if *marksmanship* has kept pace with *gun development*, especially on the Continent. The general tendency of *green* troops is to *hold high*, particularly in the excitement of *an engagement*. Many men will blaze away into the air in the vain hope of landing somewhere to the detriment of the enemy. Given this style of shooting plus a high-speed bullet and flat trajectory, and the result will be pretty *consistent over shooting*, even at *known ranges*.

"This inaccuracy is to be accounted for on two bases, both of which are reasonable. In the first place, there is the tendency referred to above to shoot high in excitement. The second explanation lies in the accepted German theory of "zone" firing. This rests on the assumption that a particular area can be so sown with bullets that it will be impossible for anything to live in it or to advance through it. Therefore, the German soldiers are trained to fire from conventional position — which may or may not be adopted in the heat of engagement — and without attempt to aim at either individual or mass. If the theory could be carried out to the full and the zone sprayed with bullets as with water from a hose, the results would justify the assumption. But here enters in the average of inaccuracy to upset the practice. Errors in aiming and holding are bad enough when troops are coached to hold on the target — whether the target is a bullseye, a living man, or an advancing mass. How much more serious must they be when the attempt is merely to drop as many bullets as possible into a given portion of the terrain. Rifle bullets are not shrapnel and *individual marksmanship is still important, no matter what the type of gun*."



## "THE AMERICAN FIELD"

DECEMBER 26, 1914

"Statistics of the great wars of the world *show a startling condition in the inefficiency of the combatants as marksmen.* In some battles it is shown that as many as three thousand shots are discharged to one combatant killed; two thousand shots to one combatant killed is a common showing. *Do not these figures carry their own lesson?"*

They do and the lesson is that the combatants have almost universally been provided with weapons with which it was impossible for them to be good marksmen under service conditions because of ineffective battle sighting.

## ARMY AND NAVY JOURNAL

FEBRUARY 13, 1915

John F. Clapham, First Lieutenant, 19th Infantry says:

"The short-comings of our present sight have been well demonstrated at Camp Perry, and the micrometer which has been so generally used in connection with it, *ought to have its adjusting feature incorporated in a new sight before long.*"

This we have now accomplished in the Warner Sharp-Shooters Instant Micrometer Sight.

## "THE RIFLESHOT," LONDON

"A vast amount of the shooting at the front is evidently being done at 20-100 yards, and as the sights of the rifles *cannot be lowered* below 200 yards, reliance must be placed on the flat trajectory and careful *aiming as low as possible.*"

In reference to this it may be said that neither the German Mauser nor British Lee-Enfield has any peep sight for target work, which sharp-shooters invariably require for accurate long-range shooting, nor any compensation for drift. If the ramp sight were readily adjustable for short ranges, these deficiencies might be overlooked, but it is not so adjustable without getting up on one's elbow, getting over above it, looking carefully down upon it and working it carefully forward while exposing the body to the enemy's fire.

In view of the close work between the European trenches, and considering the extreme ease with which we can set our target sight for long ranges, I am strongly inclined to believe that Objective battle sights for all military rifles should read 100, 200, 300, 400 and 500 yards, thus covering with deadly accuracy in battle what French officers are accustomed to call "The crisis of the offensive."

"One most valuable — one might almost say vital — factor in full range shooting that is utterly ignored by rifle clubs is *distance judging*; this again is very strange, for not only is the practice most interesting, but it leads at once to scouting work and the sharpening of the observational faculties."



"If there is one thing more than another that this war has proved it is that every atom of scientific knowledge one possesses must be brought into the fight, no device, however refined in its adjustments, can be neglected if by its use advantage can be gained."

"There has been lots of ammunition wasted from rifles and machine guns on both sides, but the substitution of machine guns and automatic rifles for the infantry weapon would result only in greater waste of ammunition."

"Superiority in one quality can best be met by showing superiority in another. If the allies cannot produce so much equipment as the enemy, they can equalize by using it more effectively; the fewer the guns, or the shells, the better must be the *marksmanship*."

"We cannot make guns enough, or shells enough, or cartridges enough, to keep on shooting all over the enemy country. We can very easily supply guns and cartridges enough to shoot at least once a week at every German in the firing line. When soldiers and artillery are really *efficient shots* they will *shoot to hit*, and when they hit, but not until, the enemy will go under."

"What we *cannot* produce in excess of our requirements is *marksmanship*."

"Thus, it seems that the new musketry method of "plastering an area" with bullets, however good it may be in theory, is impracticable; therefore, supplies of ammunition being limited — now, as always — success will attend that side shooting straightest."

"Rifles are the weapons with which battles are lost and won."

## PRESS DESPATCH

"The land-locked Swiss republic, officially and nationally, is strictly neutral, but there are many evidences as to the way in which individuals permit their thoughts to lean. An enterprising post card manufacturer has gotten out a card bearing the caption:

"The Kaiser in the Country of the Best Rifle Shots."

"Under the caption is a picture of the helmeted, spurred, booted and armed War Lord, looking at a simple Swiss soldier who has just sent a rifle bullet through the heart of a far-distant target. Under the picture is the following:

"And so, my son, says the Kaiser, there are 100,000 shots like you in Switzerland. But suppose I came with 200,000 Prussians!" The soldier replies: "*In that case, your majesty, we shall each of us fire two shots.*"

The preparedness for defence, which has caused the Swiss republic to be so carefully left alone by the warring nations who surround them is evidently not so much a matter of artillery as one of individual rifle marksmanship.

## THE SIEGE OF ADRIANOPOLE

"Their present lines face those of the allies only a *few hundred yards away*. The armistice has given them time to prepare strong positions. They will not be easily driven back, and especially as they are well covered by the fire of the magnificent Ottoman forts, which form the inner circle of defence about four kilometers from Adrianople. These modern

forts are deadly. Seen from the besieging positions, even through the strongest binoculars, they resemble merely broad unsodden spots of clay level with the ground in some distant pasture.

"To find their vulnerable points with hostile shells is thus extremely difficult. Yet somewhere in that yellow area, safe behind mounds of solid cement, though they cannot be distinguished, project the snouts of the great Turkish guns, ready to discharge missiles half as big as a man the moment fighting may be resumed.

"Picture the renewal of battle. *Chill rain* falls continually, gathering waist deep in the trenches, which hold it like so many bathtubs. *In it shiver the soldiers*, some with their rifles ever resting in apertures waiting to shoot if a Moslem head should show over those misty earthworks, *three hundred yards* across the valley. Now and then a rifle cracks. Now and then a far off cannon crashes and wheezes. The rain thickens. It is hard to see. An officer speaks a word of command. A hundred drenched and miserable men crawl forward out of the trenches, and, stooping low, trot down the hill.

"*Suddenly* they are discovered by the Turks. A straggling volley spits through the rain. From the trenches of the allies it is answered vigorously. *Another company of men leap out and run heavily down the hill.* When they reach the bottom they drop behind hummocks and stones and add the crackle of their rifles in the general uproar."

Fancy the waste of ammunition in attempting to hit enemies thus entrenched or hidden among hummocks and stones within 300 yards, with battle sights which over-shoot four feet at this range. Imagine attempting any adjustment of the present standard sights in such conditions of weather as this; *but the Warner Objective Battle Sight is designed for and perfectly adapted to exactly these conditions.*

## ILLUSTRATIONS

U. S. SPRINGFIELD RIFLE WITH STANDARD SERVICE SIGHT



U. S. SPRINGFIELD RIFLE WITH WARNER OBJECTIVE SIGHT.



WINCHESTER 45-70 OBJECTIVELY SIGHTED.

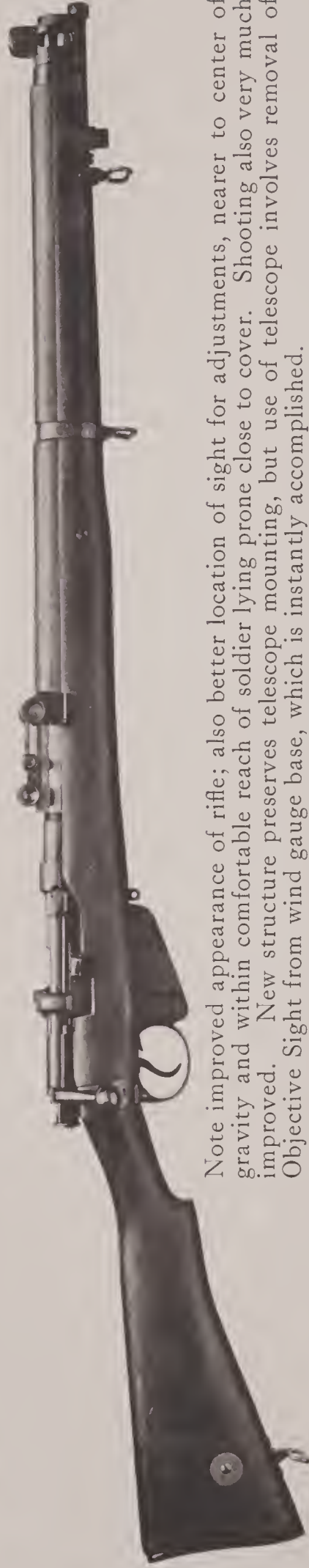




LEE ENFIELD MARK III BRITISH RIFLE WITH SERVICE RAMP SIGHT.



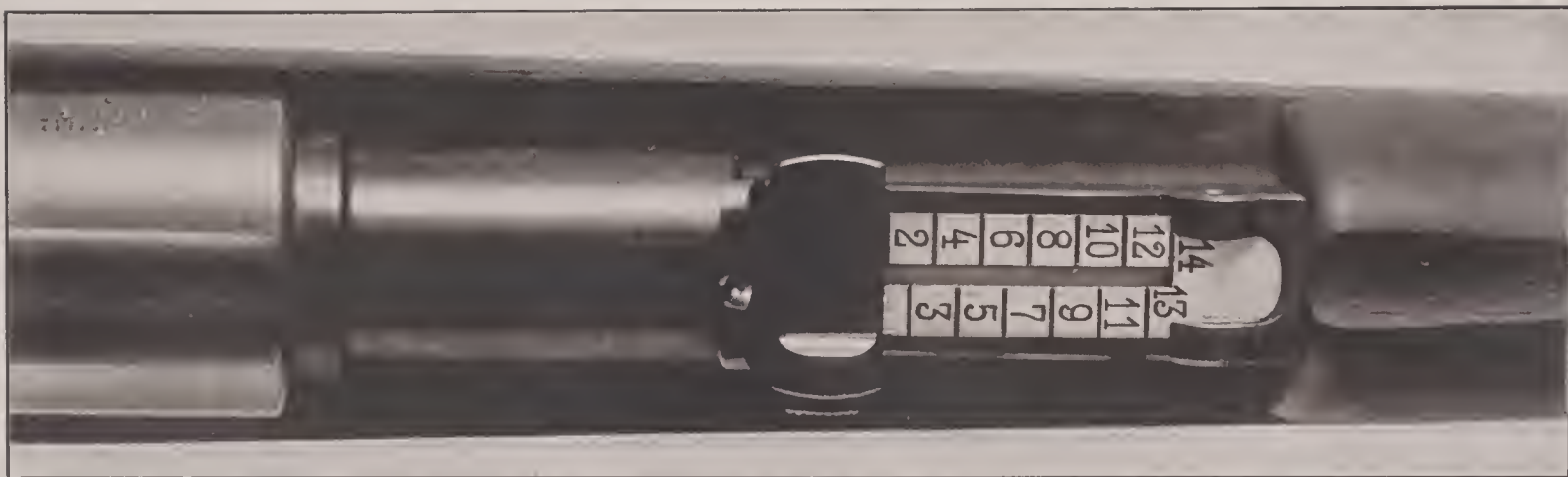
SAME RIFLE WITH WARNER OBJECTIVE SIGHT, INCREASING SIGHT RADIUS 14%.



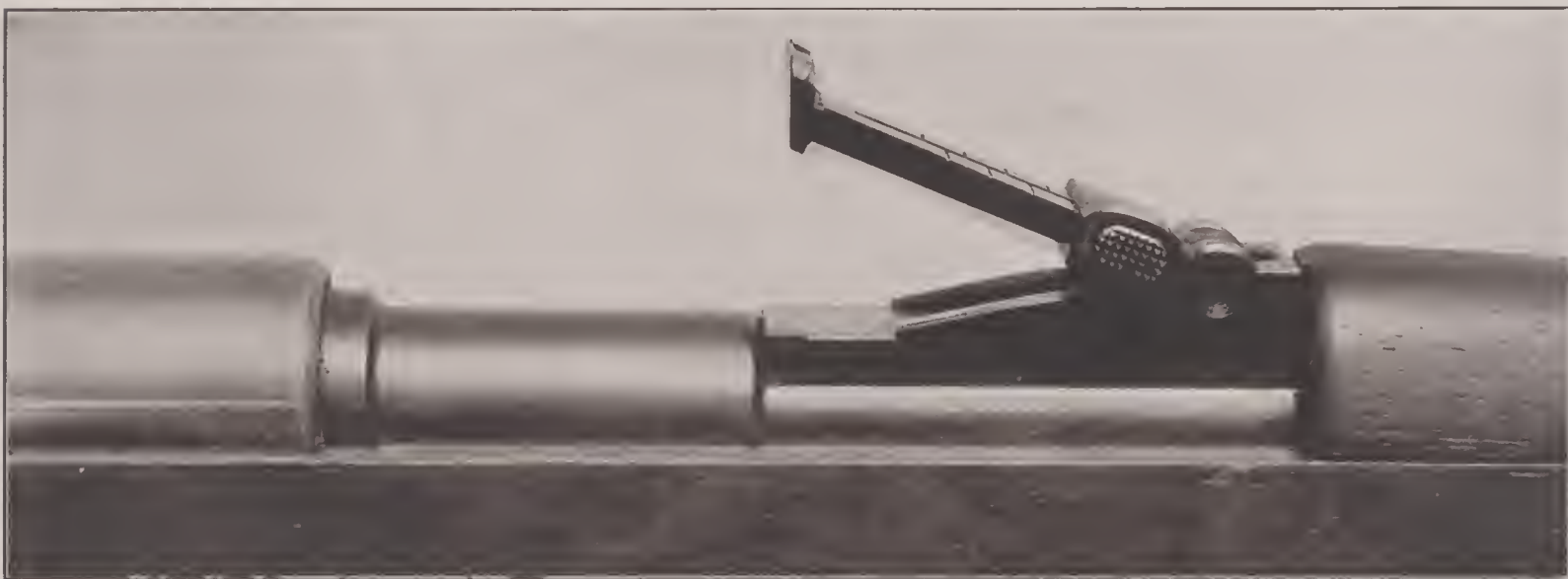
Note improved appearance of rifle; also better location of sight for adjustments, nearer to center of gravity and within comfortable reach of soldier lying prone close to cover. Shooting also very much improved. New structure preserves telescope mounting, but use of telescope involves removal of Objective Sight from wind gauge base, which is instantly accomplished.

GERMAN MAUSER CAVALRY CARBINE WITH RAMP SIGHT LOWERED.

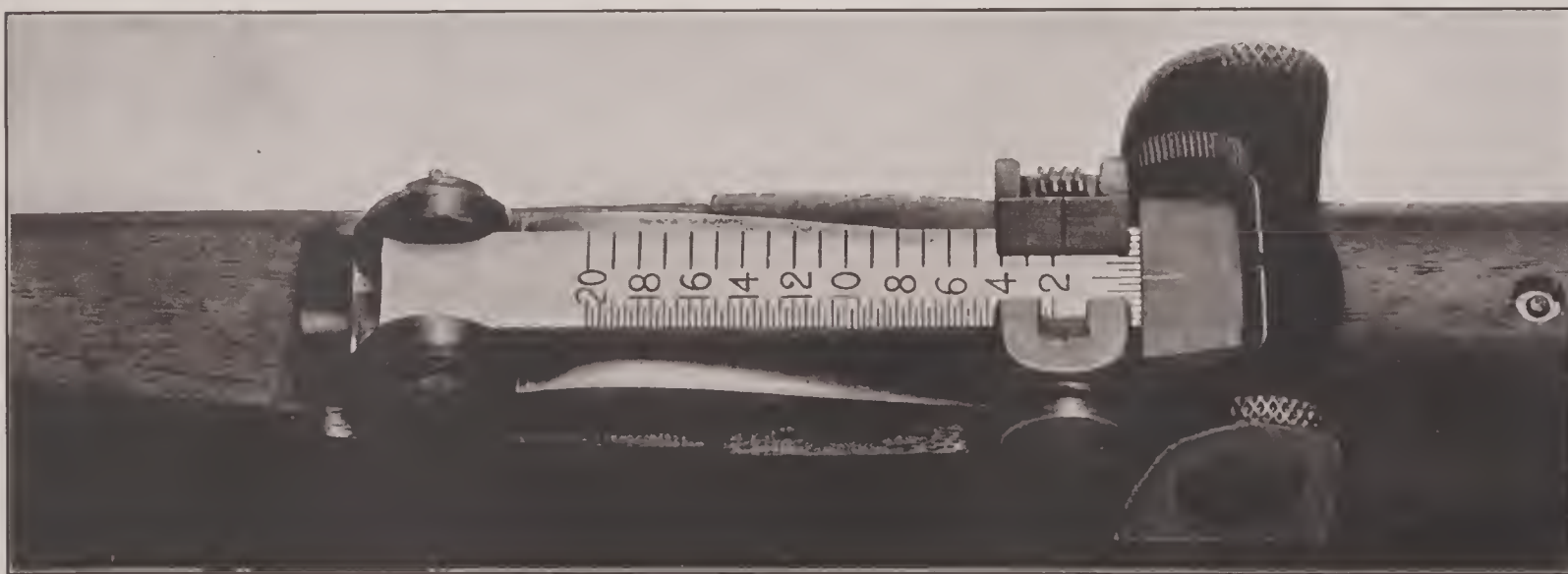




GERMAN MAUSER, RAMP SIGHT LOWERED.



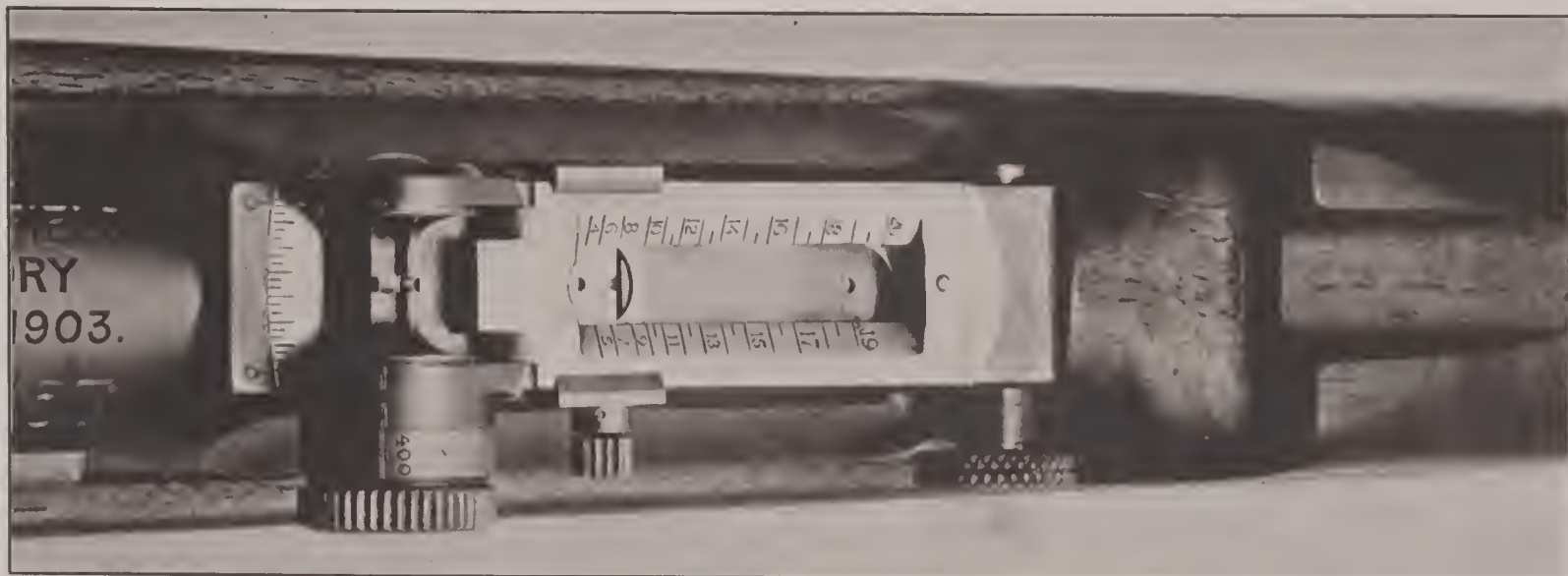
GERMAN MAUSER, RAMP SIGHT RAISED.



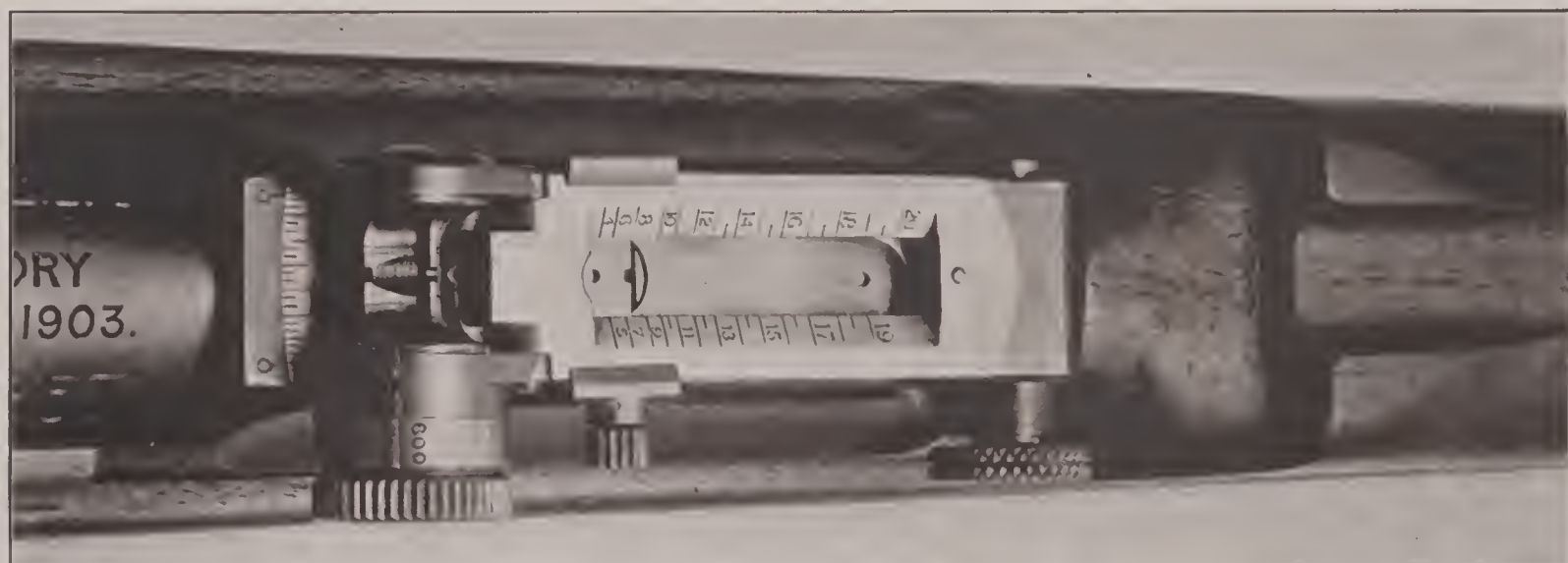
BRITISH LEE ENFIELD, RAMP SIGHT LOWERED.

This ramp sight, as well as Mauser, almost impossible to adjust with cold wet fingers. Under most favorable circumstances both of them still require considerable movement of body and removal of eye from objective.





WARNER OBJECTIVE BATTLE SIGHT, SET AT 400 YARDS ON U. S. SPRINGFIELD SERVICE RIFLE.



WARNER OBJECTIVE BATTLE SIGHT, SET AT 600 YARDS ON U. S. SPRINGFIELD SERVICE RIFLE.



WARNER OBJECTIVE BATTLE SIGHT, SET AT 500 YARDS, REAR VIEW.

These changes from range to range are made instantly with fingers numb and cold  
*and without once removing eye from objective.*



BATTLE SIGHT AT 200 YARDS.



INSTANTLY SHIFTED TO 300 YARDS.



INSTANTLY SHIFTED TO 400 YARDS.

By similar movements shift instantly to 500 and 600 yards, beyond which it cannot go and upon return it cannot come back below 200 yards. By carrying slide on target sight at bottom 700 yard range can be obtained objectively by picking up leaf with forefinger without removing eye from objective, for with slide on leaf at lowest point the *aperture* reads 200 yards and *open sight* 700 yards.



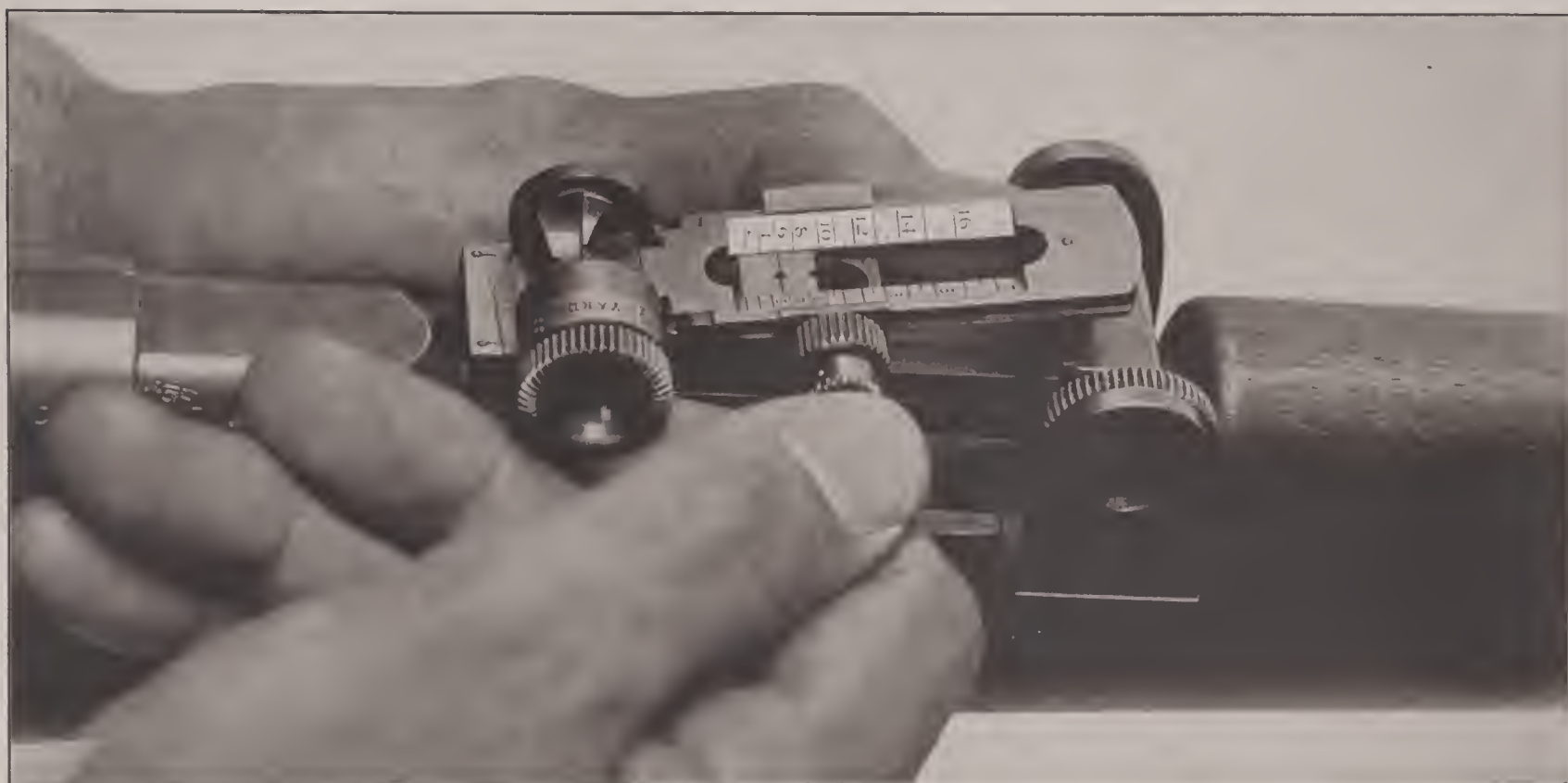
SETTING MICROMETER SLIDE AT 1100 YARDS  
BY THUMB PRESSURE ONLY.



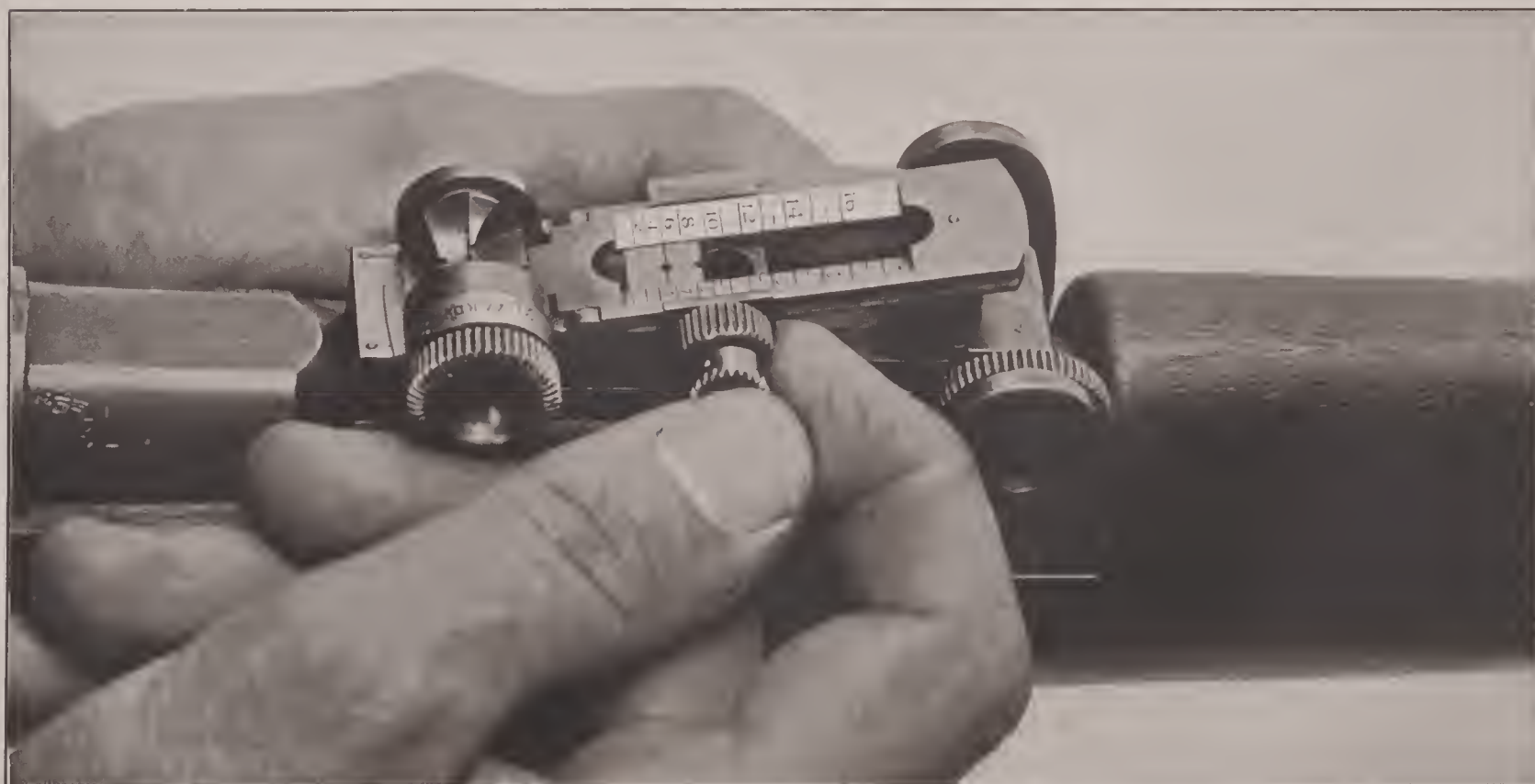
LOCKING SAME IN POSITION WITH FOREFINGER  
AGAINST LOCKING NUT.

Views above show this operation being performed with leaf vertical. It will be found much easier to perform the operation with leaf laid down, or as Captain Wise prefers, with leaf held up  $\frac{1}{2}$  inch by thumb of left hand under and against leaf while left hand grasps the barrel. Note that all operations, both of battle sight and target micrometer, are performed by thumb and forefinger of right hand only.

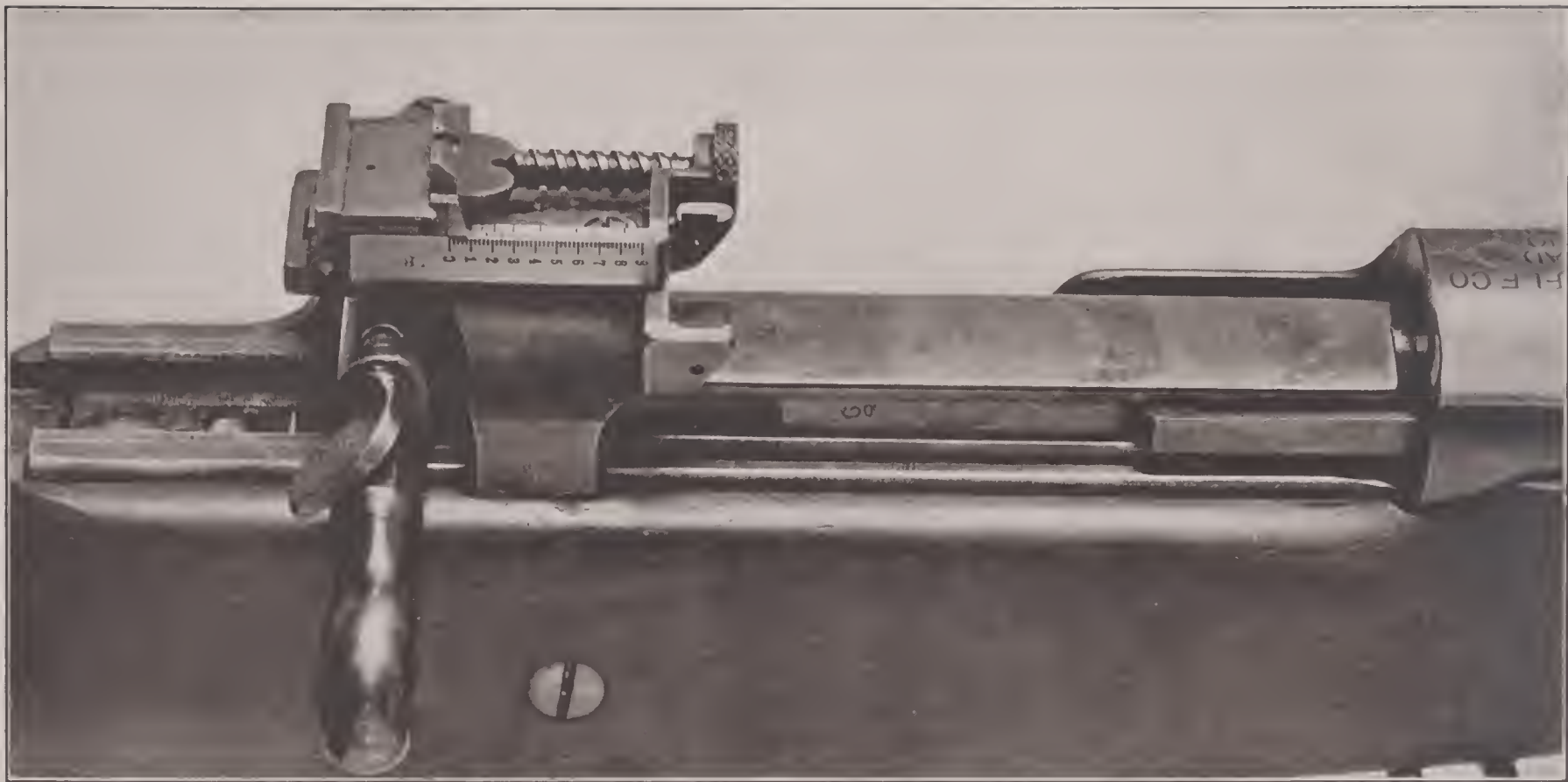




WARNER OBJECTIVE SIGHT ON BRITISH LEE ENFIELD SERVICE RIFLE.  
SETTING MICROMETER SLIDE AT 600 YARDS.



WARNER OBJECTIVE SIGHT ON BRITISH LEE ENFIELD SERVICE RIFLE.  
LOCKING MICROMETER SLIDE AT 600 YARDS.



CANADIAN MILITARY SIGHT ON ROSS RIFLE.



WARNER BATTLE AND TARGET SIGHTS ON ROSS RIFLE.







A TROPHY OF OBJECTIVE SIGHTING. PLAINS OF ALBERTA, OCTOBER, 1912.

## HUNTING WITH OBJECTIVE SIGHTS

I spent several weeks in the fall of 1912, camping and hunting in Alberta, east of the Rocky Mountains. For a hunting guide I had Jasper Demaris, a French-Cree half-breed — an extraordinary hunter of long experience, who had at various times guided several world-famous hunters of big game, including prominent members of the English nobility.

These experiences had brought him into contact with all manner of fire arms and equipment. I had with me at that time an 8 m. m. Schoenauer-Mannlicher rifle, fitted with an objective sight from one of our earlier models which, though somewhat crude, was nevertheless effective. The shooting which I could do with this rifle against small game about the plains, such as badgers, coyotes, etc., while keeping our attention entirely concentrated upon the movements of the game, greatly excited the admiration of Jasper. The experiences of one particular day will suffice to illustrate.

We were riding through the edge of Bad Lands above the Bow River when Jasper exclaimed, "See the kit fox, he's just under that yellow bank, don't stop. Ride around the other side of me and then dismount — he's about 100 yards." This fox, almost the color of the bank, was hard to see at best, but I finally got my eye on him, and using Jasper for cover, slipped from my horse.

Setting my Objective Sight at 100 yards, I was about to fire when the fox observed me and sprang up from the bank, running like a flash through the short grass. Suddenly he stopped — I could barely see him in the grass from having watched him run there and stop. "200 yards" said Jasper. Instantly and without removing my eye from him, I set the Objective Sight at 200, and by careful aim had the good fortune to catch him. At the shot he sprang straight up into the air, and was dead when we got to him. "By Gar, Boss, what a sight!" exclaimed Jasper.

After skinning him, we rode on for some hours, and about four o'clock, sighted among the low rolling hills a band of fifteen antelope, distant two miles. By a circuit we got into the hills to windward, and leaving our horses, crawled to the brow of a hill sparsely covered with low sage brush. The antelope is keen-eyed as an eagle, and the slightest movement will attract his attention. It was nearing dusk, and a brisk wind was blowing.

Lying prone behind a tiny bush, rifle ahead, with binoculars I located the buck with two does on the edge of the plain, the remainder of the does scattered out on the plain. Without binoculars it was impossible to distinguish the buck, and shooting does was illegal. "300 yards!" said Jasper. Eye on the buck I shifted the Objective Sight to 300 and fired. "Right under him!" cried Jasper, "400 yards." Buck and does made two or three stiff-legged jumps, the buck crossing the does. Impossible to distinguish him except by watching him constantly. Advancing sight to 400 I fired again. "Right in front of him," said Jasper, "You got the range but mind that wind."

An antelope is a very small mark indeed in the dusk out on the yellow plain. At this shot they ran swiftly a short distance and stopped. "500" cried Jasper. Again shifting the Objective Sight, eye never once removed from the buck, I fired again. "Right in front of him again" said Jasper. Now they came at full speed along the edge of the plain, and out on to the plain, stopping short two hundred yards distant, irresolute, having seen no movement anywhere. Back came the Objective Sight to 200 yards, and at the shot the buck fell. "By Gar, Boss," said Jasper, "what a sight."

For thirty years I have been shooting various kinds of rifles in various parts of North America, from Newfoundland to Mexico. All these rifles have been pretty good, but the sights have all been bad under one sort of outdoor condition or another, when considered as fine instruments of precision designed to direct rifle fire accurately at game.

I do not now speak at all of sights designed to direct rifle fire accurately at targets. Shooting at game involves quick action at unknown ranges, under brilliant sun light, or evening shadows, in fair weather or foul. A great many manufacturers all over the world turn out excellent rifles for large and small game, and everyone of them comes from the hands of the manufacturer with sights illy adapted to one or all of these conditions.

It is either a sight fixed for one range and adjustable only by a screw-driver, or a sight which may be set up or down by jumps to unknown ranges, or folding leaves which either flip up or down as struck by particles of brushes, etc., or are rusted tight so that they cannot be moved at all. If you take one of these rifles and buy for it a special sight adjustable by any method offered in the market, you are a shade better off, but just a shade.

Not only that, but the sights such as they are, are often badly set or of improper elevation for any practical purpose. I recall Mr. David Abercrombie telling me that not long ago a friend of his, a manufacturer of rifles, who knew that he was about to start on his fall hunt, sent to him a special new, fine rifle, inviting him to try it.

When "Dave" took his first shot at "that buck" it did not drop. Nor did it at the second shot, although "Dave" is a very old hand at the game. Thereafter he got right back to camp and "tried out" this special sporting rifle against a large piece of paper, to discover that as sighted it only shot about two feet high at 100 yards.

I have never been able to understand why the manufacturers of rifles appear to be so indifferent as to the accurate sighting of their guns, particularly when it is considered what a large proportion of rifle purchasers have no chance to test out their guns before going into the woods, or else buy them at back country points where facilities for doing anything to the sights even after they have been tried out and found wrong, are entirely lacking.

I recall with chagrin paying \$75 for a fine foreign rifle to take on a western trip. This gun had a German silver front bead sight which could not be filed down without destroying it, and at the rear, one fixed leaf and one folding leaf, reading 100 meters and 300 meters respectively. Fortunately I did try it before starting West, and found that at 100 meters the low leaf shot ten inches high and eighteen inches to the left. I got out of this trouble after a fashion by buying new sights at Tacoma.

Lieutenant Townsend Whelen, than whom there is probably no better known American authority upon this subject, in a recent contribution to the rifle press, tells of a friend who purchased a new rifle with which he particularly wished to be able on occasion to trim partridge heads at ten yards, to hit small game like woodchucks at fifty yards and to make certain of his deer's foreshoulder at one hundred and fifty yards.

He purchased a fine special sight and, with Lieutenant Whelen's help, after several hours shooting at targets, had been able to determine the number of minutes of angle and other data to which he should adjust the same for these several purposes. Lieutenant



Whelen does not say so, but he undoubtedly did, among other things, determine that having set this sight correctly for trimming partridge heads at ten yards, he was obliged to drop the sight a certain number of minutes of angle for accurate work at fifty yards, and afterwards to raise it back past the first elevation for accurate work at one hundred fifty yards; all rather a confusing operation to remember and perform when in the woods and when, just after trimming your partridge head you may hear the crash of a buck emerging from a dead-fall and stopping just an instant in the edge of the clearing.

I cannot help wondering whether Lieutenant Whelen's friend, when he goes hunting next fall, will remember, or find the card on which he noted last fall, what change of minutes of angle he needs to make for adjusting his sight for these various ranges, or whether he will not have to start all over.

A device for over-coming all these difficulties can now be so easily constructed and is so simple, that it seems ridiculous that it was not thought of and employed long ago, especially when one considers the great amount of annoyance and disappointment from ineffective shots due to established forms of field sighting which have been suffered by innumerable sportsmen for generations.

I can offhand recall many such experiences as the following:

One autumn about twenty-five years ago I was camped near a river in southern Oregon. Across the stream was a brakish lick favored by the deer. Watching in the evening I saw a deer come into the lick. I had a Marlin 40-60 rifle with aperture tang sight, and it was just at dusk.

I had fired this gun at a target enough to have got the sight adjusted accurately to 100 yards, and had a notch filed in the vertical rod to hold the setting, but, alas, when I tried to find the deer in the dark through the aperture, the aperture was gone. My eye simply could not discover it and the deer at the same time in the bad evening light under the great spruces.

Luckily I was able to look along side of the aperture, outside of the sight, to obtain my elevation, and by pure guess-work managed, in spite of it, to get my deer, but it was no thanks to the sight.

About fifteen years ago one November morning in the snow I was hunting deer along a mountain side in Maine. I had then a Winchester 30-30, with tang sight for good light and a plain bar set into the barrel for use in bad lights. As we tramped along the mountain side an occasional shower of snow descended upon us from the over-laden spruces.

Just as one of these white showers descended a doe trotted across in front of us, a moment later followed by a fine buck, who stopped at about seventy yards. It was rather confusing: the shower of snow and the sudden appearance of the deer, and helped to upset my shooting as such things will always do just at the moment when you sight big game.

Something was wrong, I could not see the buck, and by the time I discovered that the aperture was full of snow he was on the move, and by the time I could throw the tang sight down and shoot across the bar, he was on the jump, so that I only got a nice handful of thick hair out of his mane.

So much for aperture sights in bad lights and in snow. For my own part I long ago discarded them absolutely for big game hunting. They are always getting fogged up

with pine needles, dirt or something just at the critical moment. I do not say this in disparagement of aperture sights for target shooting, for there is nothing better for that purpose. The latest American and English aperture target sights are beautiful examples of workmanship in this class, although by reason of their many small parts, etc., they are unsuited for the rough conditions of field service.

Upon the occasion of my going West with the foreign rifle above mentioned, I took along my old 45-70 Winchester, with aperture tang sight, as a reserve. I first spent some weeks sheep hunting in the Fraser River country, and while I did after three weeks continuous hunting succeed in getting two good rams, it was small thanks to my sights. I had, owing to various circumstances over which I had no control, including the sights of my rifle, consumed all of my foreign ammunition and was obliged to fall back on the 45-70 when I went down into a lower country for goats and deer.

I had at this time become accustomed to the use of open sights in hunting, but the old aperture sight on the 45-70 was all right for standing game, and I got two good Billy goats without any difficulty. I was, however, very anxious to get a good mule deer, for I had never shot a first class head of that species.

We therefore moved a day's march into a fine deer range high above Bridge River, and I rode off along the benches of the mountain early in the morning with my Indian. It was very raw and cold and after two hours of riding I sat huddled together in the saddle chilled through. Suddenly Jack ahead of me exclaimed: The Stag! The Stag! Pulling my rifle from the holster I dismounted and sat down just as the stag burst into full flight out of the bottom of a little draw below us, going right up the other side across from us.

I simply could not find that jumping stag through the aperture. Every time I nearly got him into it he was gone out of it, and he was certainly a dream of a stag. My four shots at him were all utterly ineffective, for they became, under the circumstances, only the wildest guess-work.

For my part I always wish to see my game *over* the sights, to *watch* the game, to shoot, and, if I miss, look up, watch, aim and fire again without feeling around, trying to find the aperture in a tang sight, a thing which I believe to be impossible by ninety-nine percent. of men when shooting quickly at moving game, and it all moves.

But difficulties are not confined to aperture sights alone. On one of my Mexican trips I went out on to the Pacific Coastal desert facing the Gulf of California, to hunt burro deer. These burro deer are but little known, in fact, no naturalist has ever mentioned them at all, so far as I can learn, excepting Mr. E. S. Thompson, who describes them as the desert mule deer. The few sets of horns of these deer which I had seen in the camps of Mexican hunters had been beautiful sharp pointed spreading trophies, and my heart was set upon getting one of these bucks.

I had then an 8 m.m. Schoenauer-Mannlicher rifle with 100 meter fixed rear leaf sight and 300 meter folding leaf. With a good Yaqui Indian I hunted across the burning sands of that desert for seven days, tracking these deer. They are great travelers and live in a bad country.

We had at length trailed one "macho," which Don Romero declared with many gestures to be a "grande macho," all one day across the desert and through illimitable wastes of



cactus and mesquite, and camped on his trail at night with no water for our two saddle animals and only enough in the canteens to keep our own throats from cracking.

In the morning we took up his trail again, and after some hours, worked it into some small hills covered with thick growths of mesquite and various kinds of cacti. Leaving our horses we worked about on the trail on foot; Don Romero's eyes on the ground — mine ahead scanning the cover.

I had constantly kept reminding myself, as I always try to do under such circumstances to "shoot low, shoot low, shoot low," and had kept my thumb on top of the 300 meter leaf to keep it folded down so that I might be *certain* to shoot over the lower sight.

Suddenly he arose out of the thicket at sixty yards — just his fine head and neck showing and slowly turning towards me. At my hiss the Yaqui stopped and crouched, and I saw that the deer would stand but a second. With careful but quick aim I fired — and he was gone. Alas, that 300 meter leaf had scraped against the last bush I passed and stood up so that I overshot him and I saw him no more.

Thereafter I tightened up the hinge of this 300 meter sight by tapping the ends of the pin-bearing with a little hammer, whereupon it rusted tight so that I never again could get it up, except by prying it up with a screw-driver. Every sportsman who has shot a rifle much at game has had many such experiences as these.

Now the question is: What are we going to do about it? What practical means can be devised to get rifle hunters out of ninety per cent. of the trials they now suffer from the imperfect sighting of their rifles. We are not attempting to do anything for the rifleman who is devoted to target shooting. We want to help the many who are devoted to the keen health-giving manly sport of hunting game with a rifle, and who rarely if ever shoot at a target. We want to help this ninety-nine per cent. of riflemen. The other one per cent. are already well able to take care of themselves.

If we were able now to obtain an ideal hunting sight, let us see how we should describe it. We must recognize that this is in one respect a finer game than battle sighting of military rifles, for it must cover a greater variety of ranges and objectives. Battle sights, beginning at 100 yards, increase steadily in height as the ranges advance. Rear hunting sights beginning at 5 or 10 yards must, at first step or two, decline and afterwards be raised. On the other hand we need not deal with as great ranges as in military sighting nor provide for drift or windage. On the whole, therefore, our problem is greatly simplified as compared with that which we have encountered in the attempts to completely cover all these points in a successful combination military sight.

In attempting to dictate specifications for such a sight which shall be commercial, that is to say: very inexpensive so as to be available for *all* riflemen and not alone for the man of leisure or wealth, we encounter quite a problem.

First a word as to front sights. For hunting, the front sight should be an open sight, for a covered sight will fog in the dusk. It may be guarded at the sides if desired, although so far as my own experience goes this is unnecessary, for in thirty years hunting, in all manner of country on foot and upon horseback I have never yet injured a front sight.

As to the choice of forms, whether it be a bead, sloping wedge, or square top and face; that is a matter of taste, but for my own part, after experimenting with every conceivable



form of sight, and almost every kind of material, I prefer a square topped, square faced rather broad front sight of steel, faced with silver or ivory.

This square front sight should be used with a square notch in the rear sight, so proportioned that when sighting, the top line of the front sight is held level with the top line of the rear sight — a clear line of light appearing each side of the front sight in the rear sight notch. This form of sight and notch were called to my attention four years ago by Mr. Niedner and described by him as the Partridge sight. Said he: "You will think that a very coarse sight, but you will be greatly surprised to find what fine work you can do with it."

And I have been greatly surprised for the more I use this form of sight the more I find that its accuracy is not affected by variations of sunlight or shadow. The top line of the front sight always comes true with the top line of the rear sight — there is no shifting bright spot to throw me off four or five inches at 100 yards, and most marvelous of all, it seems to greatly restrain overshooting when firing quickly offhand.

I have several times at 100 yards fired offhand rapidly at a paper twelve or fifteen inches square; nailed to a tree and half obscured by twigs; first five shots with a rifle carrying bead front sight and V notch, then five shots with a rifle carrying Partridge sights, with the usual result that the V notch-bead combination will average at the top of, or off of the paper, and the Partridge sight combination will average three or four shots out of five into the paper; the difference in elevation between the two forms of sighting averaging perhaps ten or twelve inches.

The great importance of this characteristic will be recognized by every sportsman accustomed to quick shots at moving game, and while I can speak only of my own experiences in this connection, the result in my case has certainly been a marked improvement of my shooting at deer in the woods and similar game.

An ordinary blued steel front sight of this form is perfectly satisfactory except in the dusk, or when shooting down in among dark tree trunks and roots at small game or partridge heads. Such conditions necessitate a visible front sight, and I have found silver very satisfactory, although ivory is slightly better if carefully constructed and protected.

I wish that manufacturers would make their front sights adjustable sidewise. Possibly economies of production, forced by keenness of competition forbid this, but the present method of hammering the front sight over sidewise for adjustments is most unsatisfactory, for it frequently will not move at all until it moves too much. I have my own front sights all provided with a tiny set screw on each side, whereby very fine and permanent adjustment is made possible.

As to the rear sight, here comes our real problem. First as to location. It should be set well back upon the barrel, close to or over the chamber. This is the safest and best all around place for a hunting sight. A tang sight if whipped up quickly may strike the eye. Even assuming that it be an open sight, it does not so quickly catch the eye at that point on jumping game as it would if set upon the chamber.

If set upon the chamber, the sight comes near the center of gravity of the gun, so that if the gun be held comfortably in the left hand, the setting of the sight by the right hand is

readily accomplished; whereas with sight set six or eight inches away from the center of gravity, the adjustment of it by the right hand introduces a condition of unstable equilibrium and a wobbling about of the gun at a very critical moment.

As to the sight itself, most of the specifications for a battle sight apply equally to the hunting sight; for example, it should read distinctly in yards, should be very simple, of very few parts, impervious to sand, snow, rust or dirt, very firm in standing where put but responding instantly to adjustments, even with coldest fingers. In a word, it should be immovable if brushed against external objects but should not stick an instant when any adjustment is desired.

Every adjustment should be made by a controlling button projecting on the right hand side of the barrel and operated by the simplest forward or backward movement between the thumb and forefinger. Starting at 5 or 10 yards for tack driving accuracy at close ranges, the sight must drop to next desired range, and after passing the point where the line of sight stops crossing and touches without crossing the curve of the bullet's flight, must be raised to hit subsequent ranges, but all these changes from lowest to highest range must be effected by forward rotation of the button, starting from lowest range, so that the operator need never take upon his mind for an instant the thought that in advancing his sight he is at first lowering it and afterward raising it.

He should proceed from range to range with his mental processes reduced to the simplest terms — just the subconscious mechanical forward movement of the button under his thumb for a forward movement of the range. The operation should be upon the "objective" principle, that is to say: the hunter should be able to keep his eye fixed upon his objective while adjusting his sight instantly to the desired range.

The ranges to be selected for objective sighting will be determined largely by the rifle used. On my little .22 low power automatic, 5 yards to 100, with three intermediate settings are sufficient; my 45-70 has 10 yards to 400, with four intermediate settings. Manifestly a sight with settings as thus determined and marked will be suitable only for that particular class of rifle, which is as it should be, for we are not trying to get into the sight business, but we are trying to perfect a sight so effective and so simple and so inexpensive that the manufacturer can afford to put it on the rifle as a part of its regular equipment when it leaves the shop, and it is not a more serious matter for him to determine the design of sight for this particular rifle than it is for him to determine the design of a hammer or trigger for this particular rifle.

If our sight can be designed to meet these requirements, while costing no more, or but a few cents more than the inaccurate and impractical devices with which factory rifles are now sighted, we shall enable the manufacturer to put his gun out thus equipped without raising his price, while doubling its value to the sportsman.

It is certain that rifles so equipped would simply take the market, as against rifles of the same class, as now sighted.

After a most exhaustive study of these specifications by mechanical engineers and expert model makers, and the expenditure of considerable sums of money in experiments, we are satisfied that there are three general mechanical methods and only three whereby these ends may be satisfactorily achieved. These three we have perfected and by construction of model after model simplified and we believe reduced to their lowest terms.

Nearly ten years ago I almost determined to go at this problem and work it out, but was goaded into actually attempting it by the events of a trip to Newfoundland in September, 1911. I took upon that excursion the Mannlicher which I had used in Mexico, and for small game a nice little ten shot American automatic .22 calibre rifle.

This small gun was provided with an open sight which could, by means of a screw-driver, be set up or down, and which would stay where it was set sometimes as much as two or three days. There was no means of marking it or of knowing for which range it was correct.

When we got well camped on the Southwest Gander River, we targeted this gun and set it accurately for ten yards, so that it would be useful in shooting ptarmigan heads. Afterwards, by experimenting at rocks along the edge of the water across the river, I tried to form some idea of about how much I must "hold over" in order to hit a duck or similar game at 50 or 60 yards.

One fine day with "Bob" Brooking, my hunting guide, I had got settled down on a little stony island in the midst of a great area of bog to watch for Caribou. The usual does and fawns and young stags passed up the wind across the bog, and high noon came with no worthy stag or any other game in sight.

Three geese came honking over and circled around to light in the edge of a bit of water 300 yards away. Watching through the glasses I concluded that by much crawling I might get into a low bit of cover which "Bob" declared was eighty yards from the geese. With the .22 rifle I made the crawl and got into my cover at the closest possible point much besmeared with mud and hopeful.

Then arose the old, old problem of how much to "hold over" on that non-adjustable rear sight to hit a goose in the water at eighty yards. I doubt if there is any man born who can do consistent good work "holding over" and "holding under." The shot fell into the water short of the gander. The second shot, made hastily, went over his back. At the third they were gone.

Passing over experiences on that trip with the heavier game gun and its leaf sights, and they were sad enough, I will follow the subsequent history of this .22 rifle enough to indicate what was accomplished at the beginning of the development of Objective sighting.

Before leaving Newfoundland I had devised and sketched out roughly a design for the first Objective sight, and upon reaching Boston asked Kirkwood Brothers to tell me the name of the very best expert I could get to take up with me the work of its development and construct any models. Acting upon their advice I made the acquaintance of Mr. Adolph O. Niedner of Malden, who needs no introduction to American riflemen at my hands.

He received my sketches and specifications with gravity and departed without comment, but returned in a few days to express his unqualified approval of the idea of Objective sighting, and to say: "If you can work out and perfect it, you will confer a first class blessing on rifle hunting men."

Neither the limits of this booklet, nor its main purpose, afford opportunity to relate in detail the long process of development of the Objective sighting idea that followed, nor to describe the numerous mechanisms which were constructed with the assistance of Niedner



and other experts who afterward became associated with the work. I will confine myself to a few special instances of actual use of rifles objectively sighted, merely to illustrate the practical results achieved.

The last Objective sight made for this .22 rifle, which I still have on it, reads accurately at the following stopping points, viz.: 5 yards, 10, 40, 70 and 100 yards. By accurately I mean that it will drive tacks at 5 yards, shoot comfortably into a four inch bullseye at 100 yards and is relatively good at intermediate points.

No setting was adopted between 10 and 40 yards because between these two points the bullet crosses over the line of sight and drops back again so that there is but small necessity for changing sights between these points. This means, of course, that starting from absolute accurate setting at 5 yards, the rear sight drops sharply to 10 yards, and is raised but slightly at 40.

This is not a high power cartridge, and tolerably accurate judging of distances and sight setting is essential to good work, but it is a very dear little gun for all around purposes at small game. After I got the gun thus accurately sighted upon the Objective principle I was going down to my rifle range at Concord one day with an Italian gardner, who said as we came to the turn in the road: "Meeester Warniere, dare ees one wooedchuck which is eatun up all my esparagoose." "Where does he hang out, Jim," I asked. "Right along dat wall," said Jim "'mong dose san hummocks."

That was about 65 or 70 yards from the turn of the road. As we came back up from the range I stood there for a moment, looking out to the asparagus and suddenly noticed a small black head peek over one of the hummocks. I could just see it — a tiny object about the size of ones fist, motionless and impossible to detect had I not seen it move.

Keeping my eye on him I steadied the small gun against the trunk of a pine, and setting the Objective sight to 70 yards, aimed with extreme care and fired. He did not move and I almost concluded I had missed him, but could not escape the feeling that with that accurate sighting and the distance known so closely, I must have got him and sure enough, he was stone dead with a tiny hole through his skull — just about the same distance as the great big gander which, with the same little gun, I had missed so badly in Newfoundland before the invention of the Objective sight.

Last fall this same little .22 rifle was with me down in northern Maine on my moose hunt. Good old Sergeant "Bill" Ryer, of the 26th Canadian Battalion, was tremendously tickled with the Objective sights, and during the hard crust, still-hunting being impossible, used to play with this .22 constantly.

He would sit by the wood pile watching for red squirrels and mice at 5 or 10 yards, setting the Objective sight back and forth as he saw them peek out here and there at the nearer or farther range, and shooting their heads off right along.

One evening while engaged in this pastime he heard a partridge fly up down by the little trout stream below camp, and saw it light in a birch tree to pick its evening meal of buds. He tried in vain to show the bird to me in order that I might take the shot, but even himself could not be sure of it except that he had seen it light and had his eye right on the very spot.

"It's about 65 yards," said Bill, and never looking from the spot, set the Objective sight of the little .22 calibre rifle at "70," held the barrel firmly against a convenient post and at the shot the bird came fluttering down. One look away from her to shift sights would have lost her. Any guess-work of "holding over" or "holding under" would have been equally ineffective.

The very first of these Objective sights which I made was arranged for a 9 m.m. Schoenauer Mannlicher rifle, and is still being used on that same gun by my friend, Mr. Clement Ford. He utilized this equipment in his hunting of moose and caribou in New Brunswick two years ago. He returned a most enthusiastic convert to the Objective sighting principle.

He said "I should not have got my moose but for that sight. We had called and hunted a good deal without success, when one afternoon a bull, responding to the call, came out to the edge of a bog across from us and began to work along up the edge of the bog. He was a long way off at first and I could barely see him now and then — a black object or just a black spot moving about or standing among the green alders.

"I never took my eye from him or from the spot where I had seen him, but set the Objective sight at 500, and as he moved along the bog, coached by the guide to "400," and "he's about 300 now," and I watched and watched, reducing the sighting range without taking my eye from this objective which I had come so far to see.

"He was in no hurry to come along the edge of the bog and it was nearly an hour before he had got across from us, about 200 yards away. I could only then see a piece of his foreshoulder about as big as your hat, and would not have known if that was a piece of him if I had not seen it move. But I knew the guide was good at distances and I knew the Objective sight was set at 200, and, firing with extreme care I had the satisfaction of hearing him fall crashing over."

In the field a man is usually obliged to *guess* his range; even with the help of a native guide this is sufficiently difficult. When he is obliged also to guess how far *under* the object he must hold, or how far *over* it he must hold, or what fraction of an inch he must look over the top of his rear sight to adjust his fire to the range, his confusion is ten times compounded. *Single guess-work* is bad enough, *double guess-work* multiplies the error tenfold, and also creates rattled nerves, panic, buck-ague and all that.

Life itself, in fact, has for more than one sportsman, depended upon his ability to do this double guess-work with the chances all against him. The press despatches state that Stefanson, who has been lost in the North now eighteen months, had with him when last seen only a few hundred cartridges. If he is still alive, consider for a moment how priceless each one of those few cartridges has become, and how costly "a miss" must be. If he is still alive he cannot afford on his life to make anything but *hits*.

I recall reading long ago of an Arctic hunter with a small party, reduced almost to starvation. He was attempting to stalk a seal. Crawling slowly toward it at the edge of the ice, 200 yards away, suddenly at 50 yards at a small hole in the ice appeared the head of another seal. The slightest movement would alarm it; he could not adjust his sights; he tried to "hold under" and naturally missed. At the shot his first objective seal disappeared and he was forced to return to his starving companions empty handed. With our Objective sight he could instantly have made *certain* of a deadly shot.

Under such circumstances the Objective sight would be worth its weight in gold, in fact, under circumstances far less critical than these, I have often seen a time when this sight would have been worth its weight in gold to me. The weight in gold of the simple Objective sight on my 45-70 Winchester would be \$18.61. The ability to make *hits* of grand game trophies instead of missing them at the critical moment, after expending hundreds or thousands of dollars upon equipment and travel, and after weeks of toil, would often have been worth many times \$18.61.

Even my good old 45-70 Winchester, a rather back-number gun, judged by modern standards, is still a very deadly weapon against game now that I have it equipped with one of the very best of my Objective sights, and *exactly* correct at 10 yards, 50, 100, 200, 300 and 400. I can trim a partridge head with it at 10 yards, turn right around without ever looking at the gun, *instantly* setting it to absolute accuracy to any one of the other ranges for any other shot I choose to make.

One who has not tried it can hardly imagine the delight of using rifles thus sighted. The ability to adjust sights instantly and accurately upon seeing game, whether far or near, multiplies the pleasure of rifle hunting. Field shooting becomes a new story and for an humiliating waste of cartridges, for the chagrin of seeing great game escape, wounded or unwounded, there is substituted the satisfactory knowledge that if one will keep even moderately cool and shoot carefully, accurate results are entirely within his own control.

THE END.







WOODLAND CARIBOU. A FINE HEAD. NEWFOUNDLAND, 1911.













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